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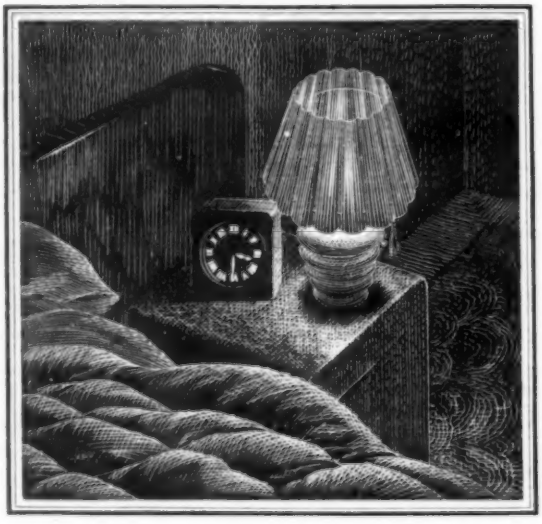

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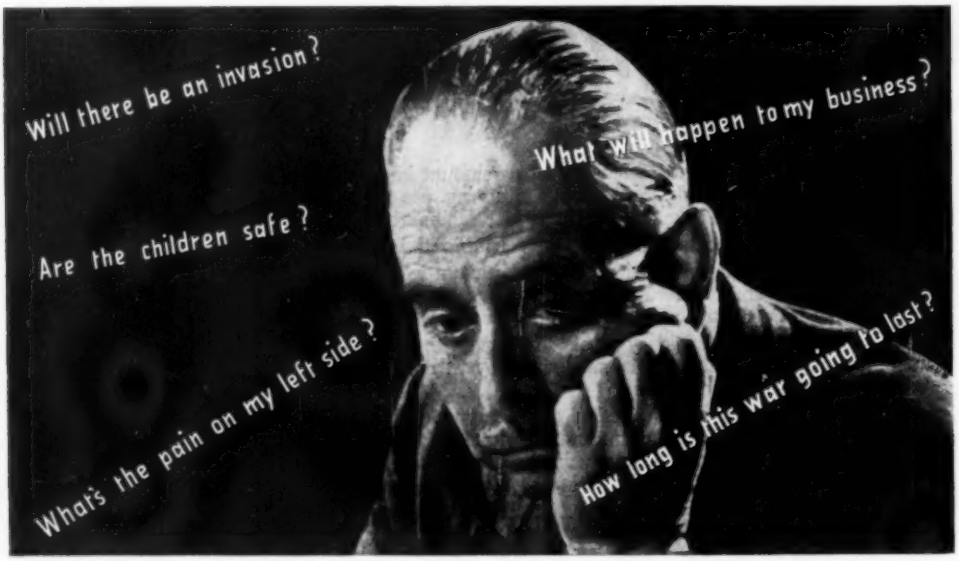
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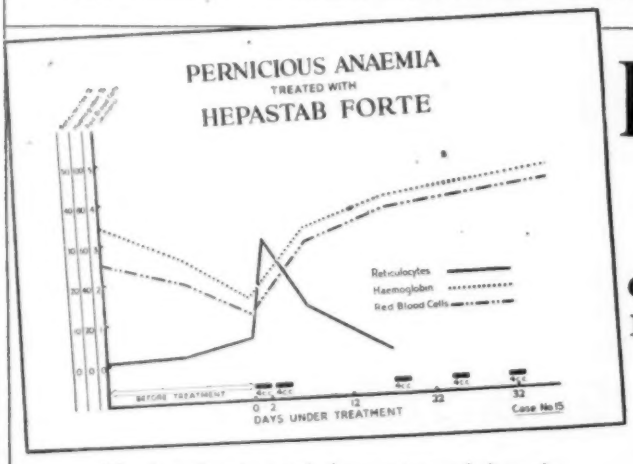

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(Horsley J.S., 1937, *Journal of Mental Science*, 83, 25.)

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12

POSTOPERATIVE ADMINISTRATION OF FLUIDS TO CHILDREN

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DURING recent years many additions have been made to our knowledge of the fluid requirements of adults in the postoperative period, and this paper records an attempt to apply this knowledge to children.

In temperate climates a healthy adult's fluid intake from all sources is usually 2000–3000 c.cm. daily; about half this amount is lost in the perspiration and expired air and the other half in the urine. The intake of a sick person is often diminished, and although his kidneys may excrete the waste products of the body satisfactorily in a smaller volume of more concentrated urine, the losses by the skin and lungs are always maintained; they are increased if sweating is profuse or if the respiration-rate is raised. As soon as the patient's fluid intake is restricted he is in danger of becoming dehydrated, and if this happens his comfort will be impaired and his progress retarded. The prognosis after operation will be greatly improved if dehydration is relieved by satisfying his fluid requirements.

Children who are suffering from acute abdominal diseases often become dehydrated. They take less by mouth, they lose more by the skin and lungs, vomiting may add to their distress and persistent vomiting may lead to a serious loss of salt as well as of water. The commonest causes of vomiting of this type in children are hypertrophic pyloric stenosis, paralytic ileus and intussusception. In the last two, large volumes of the gastro-intestinal juices may accumulate in the distended coils of bowel and so increase the degree of dehydration. Treatment may also increase dehydration if the stomach is often washed out, or if suction drainage is instituted or an enterostomy performed. Hæmorrhage into the bowel in intussusception may contribute to the dehydration, but it requires treatment by blood-transfusion if the loss of blood has been severe.

Estimation and relief of dehydration.—Coller and Maddock (1935) have stated that when an adult shows severe signs of dehydration he has lost fluid representing 6% of his body-weight. Their signs included sunken eyes, a dry inelastic skin, dryness of the mouth and tongue, and the passing of a scanty, concentrated urine. The red-cell count, hæmoglobin percentage and blood-urea were raised. The water shortage of our patients was assessed on these criteria, and the salt deficiency on the history of vomiting, the diagnosis, and, when possible, the relationship of the plasma sodium and chloride to the hæmoconcentration. It was found that, in children, degrees of dehydration ranging from mild to moderate and severe were relieved by volumes of fluid representing 3–6% of their body-weight. As the tissues absorbed the fluid the patients assumed a more normal appearance, the sunken features filled out, the skin regained its elasticity, the mucous membranes became moist, and larger volumes of less concentrated urine were passed. Lashmet and Newburgh (1932) have shown that the normal kidney can concentrate urine to a specific gravity of 1032, and that even with this concentration an adult must secrete 500 c.cm. each day to eliminate the waste products of the body. Accordingly, the restoration of normal volumes, coupled with a fall in the specific gravity of the urine, were accepted by us as proof that adequate amounts of fluid were being given. Confirmation was obtained by observing the relief of hæmoconcentration and the fall in blood-ureas.

Estimation of the normal daily requirement.—At the beginning of treatment it is necessary not only to relieve the dehydration but also to give the patient sufficient fluid to cover his normal losses. Because the basal metabolic rate (BMR), the blood-volume and the kidney function are related to the surface area rather than to the body-weight, the following formula was used to estimate the normal daily fluid requirement of children.

Child's requirement = Adult's requirement ÷ Surface area of adult/Surface area of child.

The adult's requirement was taken to be 3000 c.cm.

Table I shows the surface area factors (surface area of adult ÷ surface area of child) and fluid requirements for children of different ages of average weight and height. In children under 6 years the BMR is high in relation to the surface area (Du Bois 1936), but we have neglected this factor and using the same calculation have found the allowances satisfactory for patients down to the age of 6 months. The assessments are only approximate but with these volumes the kidneys can be relied on to make the necessary adjustments. It will be seen (table I) that the required intakes are easily remembered as follows:

750 c.cm. at 1 year — 1500 c.cm. at 8 years
1000 c.cm. at 3 years — 2000 c.cm. at 12 years

TABLE I—SURFACE AREA FACTORS (SAF) AND 24-HOURLY FLUID REQUIREMENTS FOR CHILDREN OF DIFFERENT AGES

Age (yr.)	Height (in.)	Weight (lb.)	SA (sq. m.)	SAF (1·73/SA)	Fluid required 3000/SAF (c.cm.)	Age (yr.)	Height (in.)	Weight (lb.)	SA (sq. m.)	SAF (1·73/SA)	Fluid required 3000/SAF (c.cm.)
½	25½	16	0·34	5·08	600	8	47	52	0·88	1·97	1525
1	29	21¼	0·42	4·12	730	9	49	58	0·95	1·82	1650
2	33	28	0·52	3·27	920	10	51	63	1·01	1·71	1760
3	36	32	0·59	2·88	1040	11	53	69	1·08	1·6	1890
4	40	38	0·68	2·55	1180	12	55	77	1·17	1·48	2002
5	41	41	0·72	2·4	1250	13	57	85	1·25	1·38	2170
6	44	44	0·76	2·28	1320	14	59	95	1·34	1·28	2340
7	45	48	0·82	2·11	1420						

PRESENT INVESTIGATIONS

The object of these investigations was: (1) to determine whether the methods employed for assessing the fluid requirements formed a safe basis for treatment; and (2) to find which observations were most helpful for controlling the treatment. The fluid intake and when possible the urinary output were measured for several 24-hour periods after operation.

During the first day separate specimens of urine were collected and the volume and specific gravity of each were measured. They were also tested for ketone bodies and chlorides. Subsequently the 24-hourly output was examined. Samples of blood were taken from a finger prick. Whole heparinised blood was used for the hæmoglobin and urea estimations and plasma from heparinised blood for proteins, chloride and sodium; 1 c.cm. was sufficient for duplicate analyses. Hæmoglobin was determined by Evelyn's (1936) method, in which 100% = 15·6 g. of Hb. per 100 c.cm. of whole blood; urea was determined by Lee and Widdowson's (1937) method, and Evelyn's photoelectric colorimeter was used for both. Plasma chlorides were determined by Claudius's ultramicro method, and sodium by Kramer and Gittleman's method, both of which are described by Peters and Van Slyke (1932). The proteins were estimated by the micro-Kjeldahl method. Normal ranges accepted for the blood chemistry were:

Protein	6– 8 g. per 100 c.cm.	of plasma
Urea	20– 40 mg. „ „	„ blood
Sodium	320–350 mg. „ „	„ plasma
Chlorides	340–380 mg. „ „	„ plasma

The following case-histories illustrate the calculation of the fluid requirement and its administration by various routes.

ORAL ROUTE

Children who were not acutely ill were sometimes able to take the whole of the fluid required by mouth; 4–6 hours after the operation, sips of water (up to ½ oz.) were offered at half-hourly intervals; the amount was then increased gradually, longer intervals were allowed, and fruit drinks were added. It was difficult to give enough sugar to prevent ketosis, but a 10% solution of 'Dextri-Maltose' flavoured with fruit juice and containing about 60 g. of carbohydrate per pint proved a palatable drink. It was much more effective than "hospital" lemonade, and barley sugar and boiled sweets were useful supplements. The intake, output, and other findings in the following six cases are analysed in table II.

CASE 1.—Girl of 4 years. Drainage of appendix abscess. Had been ill for 72 hours before operation, but had only

vomited once. Slightly dehydrated, but general condition good. The estimated normal requirement for 24 hours was 1180 c.cm. (table I) and with such an intake the expected urinary output was 500–600 c.cm. During the first 24 hours the oral intake was sufficient, but since it did not allow for any dehydration the total output of urine was rather low. Its specific gravity, however, fell from 1032 to 1011 and the expected volume was secreted on subsequent days. Blood for analysis was taken before treatment began, and the results confirmed the fact that dehydration was only slight; there was a low blood-urea with no evidence of hæmoconcentration or salt deficiency.

RECTAL AND ORAL ROUTES

It was usually impossible to give an ill child the whole of the required volume by mouth for the first few days after operation; in these circumstances the balance of fluid was given, preferably by rectum. A continuous rectal drip of tap water, or ¼ normal saline was well retained by children over the age of 3 years, but sugar solutions given by rectum were not. Since prolonged sugar starvation is badly tolerated by children, rectal fluids were only used to supplement oral feeding.

CASE 2.—Girl of 8 years. Drainage of appendix abscess. Had had abdominal symptoms for 15 days, but had vomited only on the first day. Appeared to be only slightly dehydrated but very toxic. The estimated normal requirement was 1525 c.cm. for 24 hours and with such an intake the expected urinary output was 700–800 c.cm. During the first 24 hours a rectal drip of ¼ normal saline was given at the rate of 1600 c.cm. in 24 hours and about 345 c.cm. was taken by mouth; the total normal requirement was therefore exceeded by a small allowance for dehydration. This extra allowance was apparently adequate since the urine output was 800 c.cm. with a fall in specific gravity to 1020. There was rapid clinical improvement and subsequent progress was uninterrupted, but it was not until the fifth day that the whole fluid requirement was accepted by mouth. The serum chemistry was normal before treatment and the changes induced by treatment were slight and of the expected form.

INTRAVENOUS ROUTE

When feeding by mouth is contra-indicated—as it is in general peritonitis, paralytic ileus and after operations on the gut—fluid has to be given intravenously, and the correct type of solution and its rate of administration are very important. The infusion of large volumes of 5% glucose in normal saline has had unwarranted popularity, and we were able to observe the ill effects of such treatment in a child who had been kept on it for several days.

CASE 3.—Girl of 6 years with pneumococcal peritonitis. Had been ill for 48 hours before admission. The estimated normal daily requirement was 1320 c.cm. with an expected urinary output of 600–700 c.cm.

Data are incomplete (table II), but the child was receiving large amounts of sodium chloride in a rather low fluid intake over 4 days, the amounts being: first day 8 g., second day 8 g., third day 11·1 g., fourth day 8·2 g., fifth day 1·66 g. The retention of salt, seen in the high level of the plasma sodium and chloride, resulted in anuria on the fourth day with slight œdema of the hands and feet. When 5% glucose was given there was a diuresis and the œdema disappeared.

The effects of administering massive doses of sodium chloride are often seen in hospital practice, and the dangers of such therapy have been stressed by Coller, Dick, and Maddock (1936), Jones and Morgan (1938), and Aldridge (1941) and other workers. Falconer and Lyall (1937) showed that an adult's minimum requirement of sodium chloride was 1–2 g. per day and that the excess in a normal diet, which may amount to 10–15 g., was excreted by the kidney. In the uncomplicated postoperative treatment of adults Jones and Morgan found that the daily administration of 5 g. of sodium chloride was sufficient for maintenance, and that this amount in the 3000 c.cm. of fluid usually required made a ¼ normal solution. These workers, therefore, recommended the use of a 4·1% glucose in ¼ normal saline solution for intravenous therapy. This fluid is isotonic; the sugar provides calories and combats any ketosis. We have used 4·1% glucose in ¼ normal saline solution to cover the normal daily requirement and any fluid shortage due to starvation. Normal saline was reserved for the relief of dehydration caused by vomiting and to replace, in approximately equal volume, any postoperative loss of intestinal juices by emesis or drainage. At the beginning of treatment the volume for the relief of dehydration was added to the estimated normal requirement for 24 hours. The hourly rate of flow was then calculated and the fluid given by continuous intravenous drip. After the dehydration was relieved the rate of flow was readjusted, and, as the oral intake was gradually increased, the infusion was proportionately withdrawn.

The following details show the calculations and allowances made for 4 children who required intravenous therapy. When their requirements were estimated they were taken to be of average weight for their age. They responded well to treatment and made good recoveries.

CASE 4.—Boy of 8½ years. Acute gangrenous appendicitis with localised peritonitis; appendicectomy with drainage. Had been ill and vomiting repeatedly for 48 hours before operation. Appeared to be very toxic and the dehydration was estimated as 3% of his body-weight. It was calculated that this required 700 c.cm. for its relief, and, since the normal requirement for 24 hours for a child of this age is 1580 c.cm., the volume to be administered was 2280 c.cm. and the urinary output to be expected was 700–800 c.cm. Because of the history of vomiting 710 c.cm. of normal saline was given to relieve the dehydration and the infusion was continued with 4·1% glucose in ¼ normal saline at a rate of flow aiming at 2200 c.cm. in 24 hours. After 12 hours' treatment there was definite clinical improvement but since the only specimen of urine had a specific gravity of 1029 the infusion was continued at the same rate. After 24 hours' treatment there was continued improvement and the patient had taken small amounts of fluid by mouth. The specific gravity of the urine had fallen to 1022 and the volume for the whole period was 750 c.cm. During the second 24 hours the total intake was 2060 c.cm. while the urine output was 1970 c.cm. The diuresis showed that since operation the intake had been unnecessarily large; this was partly because an unexpectedly high oral intake had augmented the amount given by infusion. The 700 c.cm. of normal saline given at the outset may have delayed the diuresis by retaining water. The drop in the plasma proteins and the increase in the amount of sodium in the plasma suggest that this was so. The patient's progress was unaffected, and from the third day onwards, when the estimated daily requirement was given, he secreted the expected volume of urine.

The day-to-day variations in the blood analyses in this case show the following points:

1. Before treatment the only really abnormal findings were a raised blood-urea (which dropped with the relief of dehydration in the first 24 hours) and the low plasma chlorides, caused by the previous vomiting. The chlorides were raised by the administration of normal saline and the ensuing readjustment of the patient's acid base balance.

2. There was a fall in the plasma proteins after 24 hours' treatment and at this stage they were a fair index of the plasma volume. The fall on the eighth day was probably due to a low protein intake during a period of severe infection.

3. Serial determinations of the hæmoglobin were not an index of hæmodilution in this patient. Between the first and second days there was a fall in the hæmoglobin percentage, while the level of the proteins in the plasma had risen. Hæmolysis, shown by the presence of hæmobilirubin in the plasma and a very high concentration of urobilinogen in the urine, had caused the fall. This type of anæmia may be associated with any severe infection.

4. Normal saline, 700 c.cm., was administered at the outset and as a result the sodium in the plasma was high but the plasma chlorides were still rather low. There must have been therefore considerable chloride deficiency before treatment, caused by the loss of hydrochloric acid in the vomitus.

CASE 5.—Boy of 2 years. Drainage of appendix abscess. Had been ill for 4 days; refused fluids by mouth, but had vomited only once. His dehydration, mainly caused by starvation, was estimated as 500 c.cm. (4–5% of his body-weight). The normal daily requirement was 920 c.cm. with an expected urinary output of 400–500 c.cm. In the absence of repeated vomiting only 75 c.cm. of normal saline was given at the outset and the drip was continued with 4·1% glucose in ¼ normal saline at a rate of 50–55 c.cm. per hour in the first 24

TABLE II—ANALYSIS OF FINDINGS

Days after opn.	Intake (c.cm.)				Output		Urine analysis			Blood analysis				
	Oral	Rectal	Intravenous	Total	Bowel actions	Urine (c.cm.)	SG	Ketones	Chlorides	Hb. (%)	Protein %	Urea	Na	Chlorides
												(mg. per 100 c.cm.)		
Case 1											*7·06*	*23*	*327*	*372*
1	945	..	..	945	..	300	1032	+ + +	..	..	..	..	..	..
2	910	..	..	910	..	600	1009	+ +	..	..	..	..	..	..
3	900	..	..	900	1	565	1009	+	..	..	..	..	..	..
4	1180	..	..	1180	..	645	1010	0	..	..	..	..	..	..
5	1160	..	..	1160	1	605	1013	..	..	..	..	..	..	..
Case 2										*92*	*6·64*	*24*	*318*	*331*
1	345	1600	..	1945	..	800	1028 1026 1020	+	+ +	87	6·37	..	..	..
2	560	1300	..	1860	1	860	1007	+	+ +					
3	660	1000	..	1660	..	720	1010	+	+ +	..	..	..	..	..
4	1060	500	..	1560	1	600	1012	0	+ +	..	..	..	..	..
5	1410	..	..	1410	1	750	1010	0	+ +	..	..	..	..	..
6	1500	..	..	1500	1	..	..	..	..	..	..	..	..	..
8	..	..	..	..	..	..	..	..	..	103	6·67	..	343	·348
Case 3														
1	Sips	..	890 A	890 +	..	?	..	..	..	..	..	..	..	..
2	Sips	..	890 A	890 +	..	?	..	..	..	..	..	..	..	..
3	Sips	..	1235 A	1235 +	..	?	..	..	..	..	4·9	37	372	389
4	Sips	..	910 B	910 +	..	Anuria	..	..	..	..	5·31	..	390	432
5	Sips	..	185 B 605 C	790 +	1	285	..	..	..	..	5·38	..	400	390
6	Sips	..	810 C	810 +	2	630 +	..	..	..	..	5·63	..	339	..
7	570	..	675 C	1245	..	450 +	..	..	..	..	..	..	..	..
Case 4										*105*	*5·8*	*44·5*	*334*	*322*
1	238 +	..	710 A 1570 D	2518	..	750	1029 1022	+ +	+	94	4·9	23	384	322
2	465	..	1595 D	2060	..	1970	1010	..	+ +	85	5·6	..	343	322
3	675	..	765 D	1440	..	865	1010	..	+ +	86	6·08	..	312	345
4	1164	..	0	1164	1	760	1012	..	+ +	85	5·95	..	292	341
5	1470	..	0	1470	2	850	1010	..	+ +	..	..	..	..	..
8	..	..	..	..	..	..	..	..	..	84	5·2	..	300	344
Case 5										*89*	*6*	*65*	*323*	*324*
1	20	..	75 A 1245 D	1340	..	292 +	..	+ +	+	..	..	32·5	318	343
2	366	..	487 D	853	..	348 +	..	..	+	73	5·25	19	323	312
3	631 +	..	..	631 +	1	300 +	..	..	+	72	5·1	..	..	..
4	..	..	..	..	1	..	..	..	..	76	5·54	..	320	331
Case 6														
1	0	..	300 A 610 D	910	..	+ +	..	..	..	..	..	..	..	..
2	Sips	..	690 D	690 +	..	+ + +	..	..	..	..	5·32	23	320	312
3	250	..	400 D	650	1	+ + +	..	..	..					
4	480	..	100 D	580	2	+ + +	..	..	..	53	5·32	35	318	312
5	720	..	200 E	920	1	+ + +	..	..	..	88	5·43	27	315	321
*Case 7**										*112*	*6·08*	*105*	*294*	*330*
1	..	..	800 A 550 D	1350	..	+	..	..	..	96	5·32	..	388	307
2	..	..	100 A 1260 D	1360	..	+ +	..	..	..	..	5·67	34	..	288
3	..	..	100 A 820 D	920	1	+ + +	..	..	..	..	4·95	26	..	302
4	100	..	150 A 750 D	1000	..	+ + +	..	..	..	88	4·77	39	..	313
5	400	..	500 D	900	2	+ + +	..	..	..	..	6	32	..	..
6	850	..	..	850	..	+ + +	..	..	..	..	..	..	..	..

* This patient lost much fluid by vomiting on the first day; and by duodenal drainage 60 c.cm. on the first day, 100 c.cm. on the second day and 150 c.cm. on the third day. The figures *italicised* are preoperative.

A = normal saline, B = 5% glucose in normal saline, C = 5% glucose, D = 4·1% glucose in ¼ normal saline, E = blood.

hours. With the relief of dehydration and the rapid disappearance of toxæmia, the child took fluids readily by mouth, and on the second day the normal requirement was divided between the oral and intravenous routes, the infusion being withdrawn at the end of 48 hours. Some of the urine was lost but the measured output was approaching the expected volume so that the amount of fluid administered must have been adequate for the patient's requirements.

A comparison of the blood analyses in this case before and after treatment shows the following points:

1. The blood-urea, the percentage hæmoglobin and the plasma proteins were raised when the patient was dehydrated. The plasma proteins and the hæmoglobin changed together, and either could have been used as an index of hæmodilution.

2. There was little day to day variation of the sodium and the chloride in the plasma.

CASE 6.—Boy of 7 months. Gangrenous compound intussusception; removal of gangrenous portion of gut and anastomosis without drainage. Had vomited repeatedly and had attacks of pain for 48 hours before admission. The normal daily requirement was 700 c.cm. and the volume for the relief of the dehydration was estimated as 300 c.cm. (4% of the body-weight). Because of the history of vomiting the volume for the relief of dehydration was given as normal saline at the outset. It was followed by 4·1% glucose in ¼ normal saline, and the daily allowances were carefully measured. The urine was not collected but it was passed frequently after the dehydration was relieved, and the bowel was opened regularly from the third day. He had a smooth convalescence and the blood chemistry showed little change throughout treatment. Clinical improvement was uninterrupted as oral feeding gradually replaced the infusion, and the anæmia was relieved by a blood-transfusion on the fifth day.

Cases 4, 5 and 6 show the importance of obtaining an exact history of vomiting before estimating the salt requirements for the relief of dehydration.

Postoperative treatment of patients suffering repeated losses of gastro-intestinal juices is a complicated procedure, but with careful therapy it is possible to maintain their fluid balance over a long period. The loss by vomiting, duodenal drainage or enterostomy is replaced by an approximately equal volume of normal saline. It is clear that more hydrochloric acid than sodium chloride is lost in duodenal drainage, for the plasma chloride is often low while the sodium is normal. Jones and Morgan (1938) maintain that a moderate hypochloræmia is unimportant in the absence of dehydration,

and this has been our experience. If the plasma chloride alone had been taken as an indication for giving more normal saline, an overdose of sodium with consequent water retention would have been risked.

The next case illustrated the management of a patient suffering from paralytic ileus treated by duodenal suction and rest to the bowel.

CASE 7.—Girl of 2¾ years. Gangrenous appendicitis with general peritonitis and paralytic ileus; appendicectomy with drainage. Had been ill for 80 hours before operation and had vomited repeatedly, the later vomits being fæculent. Her dehydration was severe and estimated at 800 c.cm. (6% of her body-weight), and the normal daily requirement was 1000 c.cm. Because of the history of vomiting the infusion was begun with 800 c.cm. normal saline. The extra allowance for dehydration was given over the first 48 hours, the drip being run at about 1350 c.cm. per day. Dehydration was relieved within 24 hours, but although the child was not continent it is known that urine was passed only twice during this time. Thereafter the bed was much more often wet. During the first 4 days extra volumes of normal saline were given to compensate for the loss of salt in the duodenal drainage. The serial blood analyses show that the severe dehydration was associated with a very high blood-urea and with hæmoconcentration which increased the significance of the low sodium and chloride in the plasma. After 800 c.cm. of normal saline on the first day the plasma sodium was high but the chlorides were still low. They dropped to a lower level without ill effect while the duodenal suction was being used and despite the extra salt allowances did not begin to rise until the ileus was relieved.

DISCUSSION

The postoperative treatment of these 6 children, whose fluid requirements were assessed on basic physiological principles, illustrates the method used in a larger series whose ages ranged from 7 months to 13 years. Most patients suffering from appendix abscess recover with the usual surgical treatment, which is often little concerned with the details of fluid balance. It may therefore be argued that it is better to leave well alone; it is certainly better to leave an ill child to his own devices in taking fluids than to drown him in large volumes of saline: his tissues are in no way helped to overcome infection by substituting œdema for dehydration. The aim of the treatment we have described, however, is to restore the normal fluid intake and output. Our patients have benefited from the early relief of their dehydration, and their toxæmia became much less in spite of persisting infection. It seems rational to suppose that the excretion of toxins depends on an adequate urinary output. The patients who would get better in any case are helped to a quicker recovery, while for "the poor surgical risk" the chances of survival are enhanced by restoring and maintaining body fluids.

The administration and charting of fluids presents little difficulty after some practice in the routine. The interval before the amount needed can be given by mouth varies with each patient; milk and low-residue solids should be gradually added to the diet after the rectal and intravenous fluids have been withdrawn. It is necessary to control the rate of administration carefully when using the intravenous route. No ill effects have been observed from giving the volumes recommended here, although these are considerably larger than those used in the past at this hospital. The faster rate of flow required during the relief of dehydration was well tolerated, but convention suggests that too much fluid should not be given to a sick patient; we do not now give intravenously, in the first 24 hours, a volume representing more than 4% of the body-weight plus the estimated normal daily requirement. If necessary the balance is made up on the following day, the deficiency being reflected only in a slower return to the normal urinary output. If the specific gravity of the urine falls well below 1030 it can be assumed that sufficient fluid is being given. No fixed rule can be made for assessing the salt requirement. Each case must be judged on its own merits but, if the amount to be given is regulated by the methods we have described any gross error will be avoided. Of 7 cases of paralytic ileus treated in this way 4 survived. One was admitted with a gangrenous ileocæcal intussusception and operation included removal of the gangrenous portion of colon, anastomosis and ileostomy. Because of persistent vomiting duodenal drainage was used, and the child was therefore losing gastro-intestinal secretions by two routes. Intravenous fluids, however, relieved his dehydration and after the bowel had moved his convalescence was uneventful. One of the 3 fatal cases died 6 hours after operation, the other 2 were kept in fluid balance but died with the ileus unrelieved.

The patient's progress is always the best indication of the effects of treatment, and since giving these volumes and solutions no child has become dehydrated during the postoperative period. Accurate observations on the urine output in the younger patients are often impossible, nor are they necessary. A record of the number of times the bed is wet and a daily specimen for examination usually provide sufficient information.

The interpretation of the blood chemistry needs great care, particularly that of single samples. We have found that some sick children have comparatively low hæmoglobin levels and that the concentration of protein in the plasma may also be low even when they are dehydrated. Neither can therefore be used as a guide to the amount of fluid required to relieve dehydration. During the postoperative period hæmolysis may cause a sudden drop in the percentage of hæmoglobin, and the plasma proteins tend to fall as a result of infection and starvation. When fluids are given intravenously the rate of infusion may affect the findings, and the blood should not be taken for analysis if the drip has been running quickly during the preceding hour. If these complicating factors have been excluded, however, serial estimations may be very useful as an indication of hæmodilution, for it has been shown that water retention follows the administration of excess of salt. A fall in the plasma proteins below the œdema level (5 g. per 100 c.cm.) must be taken as a warning to avoid further dosage while maintaining a sufficient water intake for an adequate urinary output. If the urine remains scanty a 20% glucose solution is a valuable diuretic. It has already been pointed out that low plasma chlorides are to be expected when there have been persistent losses of hydrochloric acid from the stomach, and that they alone should not be used as a guide to the amount of saline required.

Further work is needed before assessing the value of plasma transfusions for maintaining the level of the proteins in the plasma of children who are ill for a long time, but our findings suggest that they might be useful. It must be remembered that the salt content of plasma is approximately equivalent to that of normal saline.

This series of cases shows the allowances made for children with acute abdominal diseases, but the principles are applicable to all postoperative treatment.

SUMMARY

Children's fluid requirements vary with their surface area rather than with any other measurement. They have been calculated on this basis and tabulated.

Methods are given for assessing the postoperative fluid requirements of children.

A series of cases was treated and the details of 6 are described. Fluid was given by mouth, by rectum or by vein as circumstances demanded.

We wish to thank the honorary staff of the Children's Hospital, Birmingham, for permission to treat their cases, and for the facilities to carry out these investigations; and Prof. L. G. Parsons and Dr. R. A. McCance for their advice.

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SULPHONAMIDES BY MOUTH IN THE TREATMENT OF IMPETIGO

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THIS paper forms the preliminary report of an investigation on the treatment of impetigo. The oral administration in adequate dosage of sulphonamides has been accompanied by results sufficiently satisfactory to justify publication at this stage.

The streptococcus is said to be the organism primarily associated with impetigo contagiosa of Tilbury Fox (Sabouraud 1928, Macleod and Muende 1940). In the lesions a pathogenic staphylococcus is often associated with the streptococcus. At times the staphylococcus is the only organism found. In such instances the more robust staphylococcus may have persisted and multiplied at the expense of the streptococcus which, overrun, has died out. We ourselves believe that there is a bacteriologically distinct entity—a staphylococcal impetigo—having close clinical resemblance to the streptococcal impetigo and being distinct from Bockhart's impetigo. The impetigo of Bockhart is essentially a pustular folliculitis and as such has a morbid anatomical relationship to sycosis. Bockhart's folliculitis might be a better term for this condition.

It is rational to expect that substances having an established streptocidal or streptostatic effect should benefit any cases of streptococcal impetigo, and that those cases in which staphylococci are the primary infective agent, or in which staphylococci have become the principal infective agent, should benefit from a staphylocidal or staphylostatic substance. Our therapeutic investigations started from this primary contention. They were encouraged by the startlingly successful result obtained when we treated our first case, an intractable one, with sulphathiazole. Individual series were treated by mouth, using sulphanilamide, sulphapyridine, sulphathiazole or sulphadiazine. In addition a short series was treated with sulphanilamide applied locally and another with sulphapyridine applied locally as a powder or simple paste. For control a series was treated with gentian violet.

MATERIAL AND METHOD

Bacteriological examination of the lesions was carried out on admission. Sulphanilamide was used for a relatively high proportion of those patients from whose lesions streptococci were isolated. Sulphathiazole and sulphadiazine were reserved for the worse cases—those which had shown no improvement, or had retrogressed, under alternative treatments either outside or in this hospital. These forms of treatment included the use of unguentum hydrargyri ammoniati, gentian violet, brilliant green, ichthyol and calamine, sulphanilamide and sulphapyridine applied locally and sulphanilamide given by mouth. Before any form of treatment was started 3 days were allowed to elapse to satisfy ourselves that the condition was not improving and to take careful cultures from the lesions.

The average duration of the disease before using sulphathiazole was 30 days, the minimum duration 3 and the maximum 101 days. Few patients were in our hands before the 4th day; the majority had had some form of treatment before reaching us. All our patients except one were males from 18 to 45 years of age. The majority were between 20 and 35. The one exception was a female child of 2 years.

The effectiveness of all forms of local treatment in severe cases of impetigo must in a measure depend on the diligence and intelligence of those who apply them, and will therefore vary in different hands. Administration by mouth is free from this objection, though it may be argued that differences of absorption give opportunities for variation. We have attempted to meet this by estimating the blood level of free sulphonamide reached.

At first 18 g. of the sulphonamide was given in 4 days, but though we had some successes certain patients required further treatment. The dosage was increased therefore to 24 g. given in either a 5-day course of 7, 6, 6, 3 and 2 g., or a 6-day course of 7, 6, 3, 3, 3 and 2 g. An initial dose of 2 g. was given and 4-hourly administration continued for the next 72 hours followed by 8-hourly administration to the end of the course. Occasionally a heavier dosage was required and it was important to maintain a steady concentration of the drug through the 24 hours. On the 24 g. course the concentration of free sulphathiazole or free sulphadiazine in the blood of most patients was above 5 mg. per 100 ml. of blood. We have had cures in patients whose blood concentration never rose much above 4 mg. per 100 ml. Serum was collected from the lesions of 4 patients under sulphathiazole. Qualitative tests demonstrated the presence of a sulphonamide but the amounts were too small for quantitative analysis.

During the 5 days of treatment all patients were kept in bed. Patients on sulphonamides by mouth received no local treatment.

RESULTS

Tolerance and reactions.—With the dosages given the sulphathiazole was well tolerated, though most patients felt some depression. Had the drug been available in quantity, higher dosage could have been tolerated by most, in some instances with advantage. In one patient only there was a sharp reaction after 60 hours of treatment. He developed a widespread rash with a conjunctivitis, so severe that at 72 hours the sulphathiazole was stopped, whereupon he recovered completely. In no case did a serious neutropenia develop and in no case did we observe macroscopic hæmaturia.

With sulphapyridine the sense of depression was more severe. In some instances persistent nausea and vomiting, in spite of the use of different vehicles for the drug, forced us to stop treatment since we did not feel that the nature of the disease justified us in pushing the course to its conclusion. Here again no dangerous neutropenia developed during treatment, and no cases of macroscopic hæmaturia were observed.

Apart from the depression common to all, there were no other incidents in the three series treated with sulphanilamide, sulphapyridine or sulphathiazole, but the patients on these drugs all agreed that in the first 48–72 hours they did not feel capable of heavy mental or physical strain. In striking contradistinction the short series on sulphadiazine had no feeling of depression and though they were kept in bed were confident that they were fit to be up and about their work. None of this series developed neutropenia; one had transient hæmaturia which cleared without any demonstrable after-effect.

TABLE I—ANALYSIS OF TREATMENT IN IMPETIGO CASES

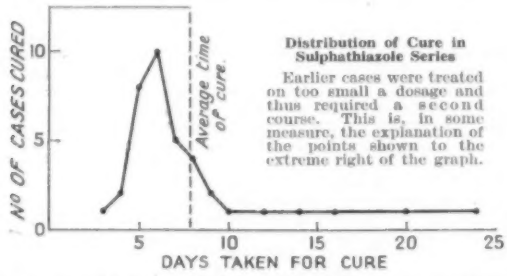
Treatment	Cases treated	Cured	Av. time of cure (days)	Lesions containing β-hæmolytic streptococci	
				Cases	Cured
Sulphanilamide by mouth	50	26 (52%)	8	21	16 (76%)
Sulphapyridine by mouth	35	21 (60%)	7	15	12 (80%)
Sulphathiazole by mouth	46	38(82·5%)	8*	6	5(83·5%)
Sulphadiazine by mouth	10	8 (80%)	7	4	4 (100%)
Gentian violet, local†	30	15 (50%)	11	20	12 (60%)
Sulphanilamide, local	8	4 (50%)	7	3	3 (100%)
Sulphapyridine, local	10	5 (50%)	6–7	5	3 (60%)

* See graph of rate of cure of cases on sulphathiazole.
† All relatively mild cases.

During a successful course the lesions dried up rapidly in 36–72 hours. In the next 24–48 hours the crusts fell away leaving a flushed surface. This flush disappeared gradually and the skin returned to normal. Occasionally residual crusts persisted but these fell off without further treatment. The patients did not shave until the 4th or 5th day of their course. After each shave a simple antiseptic shaving lotion was applied all over the shaving area. The pillow-slips were changed each day. No other ancillary treatment was used. When the course was completed the patients were kept under observation for a further 3 days.

The results are analysed in table I. It will be seen that sulphathiazole stands out as the drug of choice.

Patients from whose lesions streptococci were isolated responded almost equally well to sulphanilamide, sulphapyridine and sulphathiazole. The graph of the cure-time ratio of sulphathiazole shows that the average


Nº OF CASES CURED
10
5
0
Average time of cure.
5
10
15
20
25
DAYS TAKEN FOR CURE
Distribution of Cure in Sulphathiazole Series
Earlier cases were treated on too small a dosage and thus required a second course. This is, in some measure, the explanation of the points shown to the extreme right of the graph.

cure-rate of this drug is heavily loaded by a few patients who needed extended courses of treatment. Some of these were patients early in the series when we had not adjusted our total dosage to 24 g. The series on sulphadiazine is too short for proper comparison, but the preliminary results from it are as encouraging as those with sulphathiazole. Finally, though gentian violet at times produced satisfactory results in localised lesions it does not compare with sulphathiazole or the other sulphonamides when the lesions are spreading rapidly or already widespread. At the bottom of table I are two short series treated by local application with sulphanilamide and sulphapyridine. We did not use sulphathiazole locally, wishing to conserve our stocks for treatment by mouth. With local applications we did at times get very good results, but, as we have said before, we feel that the efficacy of local treatments must always depend on the skill of persons applying them.

Causes of failure.—Our failures appeared to be the result of certain well-defined causes. The first was persistent auto-reinfection; in these cases we could produce temporary cure, but one small area would persist in breaking down when administration of sulphonamides was stopped. These areas were most often on the upper lip, at the angles of the nostrils or near the ear. In a number of such cases swabbing of the nose or examination of the ear revealed a primary infection which we were often able to clear up by diligent local treatment. Secondly, there were the chronic impetiginised fissures occurring behind the ears and at the corner of the mouth. We had considerable success in treating these with local applications. In particular, gauze soaked in a 25% solution of 'Sulphonamide E.O.S.' packed behind the ear and renewed twice daily was successful in retro-aural fissures. Thirdly, there was a group with associated mild sycosis—probably cases of Bockhart's folliculitis with a superimposed sycotic element sent to us labelled impetigo. These were all difficult to treat though many showed some improvement.

Finally, we met 2 cases in which our in-vitro tests led us to believe we were dealing with organisms truly resistant to sulphonamides. One was a hæmolytic streptococcus which would grow on sulphathiazole agar and showed no inhibition by Fleming's ditch-plate technique; the lesions healed slowly under gentian violet. The other was a coagulase-positive *Staphylococcus aureus* which grew not only on sulphathiazole agar but on the gentian violet plates which we used for the isolation of streptococci. This patient kept having recurrences under all forms of treatment. He was not a carrier of pathogenic staphylococci. We do not think these cases common and believe the first three causes of failure are the most usual.

Fomites.—From cultures taken from the collars of 10 greatcoats selected at random from one impetigo ward we grew a coagulase-positive *Staph. aureus* in 5 cases and β-hæmolytic streptococci in 4. We had 2 clear-cut return cases with outbreak on the neck where the greatcoat collars could be incriminated.

Other skin conditions.—A few cases of infected scabies, furunculosis and sycosis were also treated with sulphonamides by mouth. The results are shown in table II, which needs no amplification.

DISCUSSION

Cruickshank (1941), in an analysis of 23 cases of impetigo contagiosa, cultured a β-hæmolytic streptococcus from 15 and a *Staph. aureus* from 18 out of the 23 cases. He said that in all cases where a hæmolytic streptococcus could not be recovered a staphylococcus was isolated. Thus from 43% he recovered both streptococci and staphylococci, in 35% he recovered a staphylococcus only and in 22% he recovered streptococcus only. In cultures of lesions from 190 consecutive patients we recovered both organisms in 42%, *Staph. aureus* in 47%, and hæmolytic streptococci in 11%. The following factors probably contributed to the high incidence of staphylococci in our series: few patients reached us before the 4th day of the disease, most much later; a number had been treated before reaching us with antiseptics calculated to kill the streptococcus; some sent as impetigo were undoubtedly examples of Bockhart's folliculitis, as we would prefer to call it. Our technique for the isolation of the streptococci was similar to that used by Francis, the lesion being sampled with a platinum loop or wire with aseptic precautions.

Though these investigations suggest that adequate oral administration of all sulphonamides have their place in treatment of impetigo they demonstrate that sulphathiazole is superior to both sulphanilamide and sulphapyridine. In selected cases all three gave excellent results. Sulphadiazine seems to be as effective as sulphathiazole, though the series treated with it was small. It produces less constitutional upset. When

TABLE II—MISCELLANEOUS SKIN INFECTIONS TREATED WITH SULPHONAMIDES BY MOUTH

Condition	Cases treated	Organism isolated	Treatment	(*a*) No. cured, (*b*) Av. time of cure (days)
Scabies, secondary infected by scratching *	6	β-hæmolytic streptococci	Sulphanilamide 24 g.	(*a*) 6 (*b*) 6
	1	*Staph. aureus* coag. positive	Sulphapyridine 24 g.	Healed after 10 days with help of local application of sulphapyridine powder
	2†	,,	Sulphathiazole 18 g.	(*a*) 2
Furunculosis	3	,,	Sulphathiazole	(*a*) 1, (*b*) 5
	2	,,	Sulphapyridine	(*a*) 1, (*b*) 5
	1	,, ‡	Sulphanilamide	0
Sycosis	5	*Staph. aureus* coag. positive	Sulphapyridine	(*a*) 0; 1 improved
	9	,, §	Sulphathiazole	(*a*) 2; 3 others improved

* In 3 cases β-hæmolytic streptococci were isolated from fingernails. † Folliculitis. ‡ Occasional β-hæm. strep. § Occasional β-hæm. strep. in 1 case.

the results of the cases from which streptococci were isolated are analysed, the margin of sulphathiazole's superiority over sulphanilamide and sulphapyridine is much narrower; this is not surprising from experience with these drugs in other fields.

A certain number of reports on the treatment of impetigo with the sulphonamides have already appeared. Thus, Zederbauer (1939) claimed success with 'Uleron' in chronic recurrent cases and Erskine (1941) mentions oral administration of sulphonamides in small doses. Many writers have made claims for the sulphonamides applied locally. Among the most recent, Steigman (1942) appears to have had convincing results in children using sulphathiazole ointment, though one wishes he had used sulphanilamide ointment on some of his controls for comparison. The work of Carslaw and Swenarton (1941) is not clear cut, in that they use sulphanilamide with brilliant green, so that it is difficult to decide to what extent their cure was hastened by either one of the drugs. Probably time will show that the most effective rapid method of treating impetigo is the combination of adequate oral administration with local application of a sulphanilamide, preferably sulphathiazole or sulphadiazine. We have combined sulphanilamide with sulphathiazole in 2 cases in attempts at economy; these were both cured in 8 days but are not included in this series, to avoid confusion.

SUMMARY

Administration of the sulphonamides in adequate dosage by mouth is of value in the treatment of impetigo.

Sulphathiazole and sulphadiazine are the drugs of choice, but where streptococci are the predominating organisms in the lesion sulphanilamide or sulphapyridine are almost as satisfactory, provided adequate concentrations are maintained.

Causes of failure were (1) auto-reinfection from nose or ear; (2) chronic impetiginised fissures behind the ears or at the corners of the mouth; (3) association with a sycosis, these cases probably being examples of Bockhart's folliculitis; (4) sulphonamide-resistant organisms. The first three causes are the most usual.

Our thanks are due to Major-General L. T. Poole and Brigadier E. C. Beddows, through whose kindness so much clinical material was directed to us. We have to thank Colonel Rees for permission to publish this paper.

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ANTIGENIC PROPERTIES OF *H. PERTUSSIS* IN RELATION TO ACTIVE IMMUNISATION

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WITHIN the last few years the value of *Hæmophilus pertussis* vaccines for active immunisation against whooping-cough has been extensively investigated clinically. The results obtained by a number of workers, summarised by Maclean (1940), show that although the immunity produced is substantial it is not quite of the solid type known to occur after some other prophylactics, for instance those for diphtheria. It is generally believed that the protection which pertussis vaccines confer is due to specific antibacterial substances evoked in the inoculated child. The bacterial antigen involved is heat-stable and probably closely related to the antigenically active fraction extracted from *H. pertussis* by Cruickshank and Freeman (1937). But *H. pertussis* also elaborates a toxin which is lethal for rabbits, guinea-pigs and mice when injected intravenously, dermonecrotic in small doses, extremely heat-labile, detoxified by formaldehyde and antigenically active. This toxin is extracted from the bacillus by disrupting the organism by physical methods (Bordet and Gengou 1909, Teissier et al. 1929, Miller 1934, Demnitz et al. 1936, Evans and Maitland 1937, Evans 1940, Strean and Grant 1940, Flosdorf and Kimball 1940). It is not precisely known what part pertussis toxin plays in the pathogenesis of whooping-cough, but it seems reasonable to believe that resistance to a toxin so potent which is also antigenic might have some importance in immunity. Any investigation of new types of vaccine for prophylaxis, with the object of obtaining better protection, should therefore take into consideration the possible value of producing immunity to this toxic element.

There is no evidence to show whether the pertussis vaccines which are now used in the prophylaxis of whooping-cough are capable of stimulating the production of antitoxin. The vaccines are made from whole bacilli and toxin present originally has had its lethal and necrotising properties destroyed by the treatment to which the vaccines have been subjected during their preparation; but whether the antigenic property of the toxin has been retained, and if so to what extent, is not known. The work here described was carried out because it was thought desirable, before attempting to investigate the value of toxin as an immunising agent in whooping-cough, to study the antigenic quality of various preparations of *H. pertussis* as regards their ability to stimulate the production of (*a*) antitoxin and (*b*) antibacterial antibody.

EXPERIMENTAL PROCEDURES

The strain of *H. pertussis* used throughout this investigation had been preserved in the dry state in vacuo since its isolation and was in the phase 1 and fully toxigenic condition. All preparations were made from bacilli grown on Bordet-Gengou medium for 48 hours.

Pertussis preparations.—(*a*) A toxic extract detoxified by formaldehyde. The toxic extract was prepared by the method described by Evans and Maitland (1937), in which the organisms were first killed by alternate freezing and thawing, afterwards dried from the frozen state and then ground in an agate mortar for 30 min. Saline was added to the dry, ground bacilli in the proportion of 1 c.cm. to 5 mg., and when a uniform emulsion had been obtained this was centrifuged at high speed, giving a slightly opalescent supernatant fluid. The toxic potency of the supernatant fluid was determined by intradermal titration in the rabbit. The average minimal reacting dose was 0·2 c.cm. of a 1 : 1000 dilution, which was equivalent to $0{\cdot}3 \times 10^{-3}$ mg. of dry extract. The extract was detoxified by adding formaldehyde to give a final concentration of 0·08%* and incubating at 37° C. for two weeks, when 0·2 c.cm. of the undiluted extract (1000 m.r.d.), injected into the skin of a rabbit, failed to give a reaction.

(*b*) A toxic extract detoxified by heat. The toxic extract was prepared in the same way as (*a*) but was heated at 56° C. for 30 min. This treatment, as shown by the intradermal test, rendered it non-toxic.

(*c*) A suspension of organisms killed by formaldehyde. A suspension of bacilli was made in saline so that 1 c.cm. contained 5 mg. of bacilli as determined by the dry weight. This concentration was used so that the preparation would be comparable, in so far as toxin was concerned, with preparations (*a*) and (*b*), in which 1 c.cm. of extract was obtained from 5 mg. of dry bacilli. The suspension was treated with formaldehyde in the same way as (*a*) and was found to be sterile and devoid of toxic properties.

(*d*) A suspension of organisms killed by heat. This suspension was of the same concentration as (*c*) and was heated for 30 min. at 56° C. After this treatment the suspension was sterile and non-toxic.

Immunisation of rabbits.—Rabbits weighing between 2 and 3 kg. were given weekly subcutaneous injections of the pertussis preparations in increasing amounts each week: 10 rabbits received the extract treated with formaldehyde and 3 the heated extract; 6 rabbits were injected with the formaldehyde-treated bacilli and 3 with the heated bacilli. The subcutaneous route was chosen because from previous work the impression had been gained that it was more likely to yield antitoxin than intravenous inoculation. The opportunity was taken, however, of including in the series 3 rabbits inoculated intravenously with preparation (*a*), to obtain direct evidence on this point. The courses of immunisation followed a common plan, each rabbit receiving a total dose of 6–7 c.cm. over a period of 8–9 weeks. At the end of the course of injections the rabbits were left without treatment for 7 days before the following tests were made.

Active immunity of rabbits to toxin given intradermally.—The treated rabbits were compared with one another and with normal controls as regards immunity to toxin, by intradermal inoculation of graded doses of toxic extract. The rabbits were observed daily until the sixth day, when the final readings were made; the highest dilution of toxin which produced a definite necrotic area was taken as the end-point. By comparing the reactions of the immunised rabbits with those of control rabbits, the approximate number of m.r.d. of toxin to which the rabbits were immune was determined.

Active immunity of rabbits to toxin given intravenously.—About 3 weeks after completion of the intradermal test all the rabbits which had been immunised with formaldehyde-treated toxin and 3 of those which had received formaldehyde-treated bacilli were also tested for their resistance to toxin injected intravenously. It was found that the lowest dose of toxin which always killed a normal rabbit within 24 hours was 0·15 mg. per kg. body-weight,

* In Great Britain the term "formalin" is frequently used as a synonym for liquor formaldehydi, an aqueous solution containing approximately 40% of formaldehyde. In this paper the actual quantities of formaldehyde used in the preparation of materials are stated in percentages, and the terms "formalin" and "formalinised" have not been used.

and this dose was taken as the lethal dose. The immunised rabbits received from two to fifty times this dose.

Tests with sera of immunised rabbits.—The sera of the rabbits, taken a few days after the final readings of the intradermal test, were examined for antitoxin and antibacterial antibody.

The examination for antitoxin was similar to that previously described (Evans 1940). Serum in varying dilutions was mixed with a constant amount of toxin (4 m.r.d.) and the mixtures kept at room-temperature for an hour, when they were injected intradermally into the skin of rabbits. By this method the highest dilution of serum which would neutralise a constant amount of toxin was ascertained. A valid comparison of the antitoxin contents of the different sera was obtained, because the same toxin preparation, kept throughout in the dry state, was used in all the determinations. A control test with normal rabbit serum and the same toxin was made on each rabbit inoculated in this test. It has been shown that pertussis toxin is neutralised by antitoxin in vitro in accordance with the rule of multiple proportions, so that the results of this test can be expressed in terms of the number of m.r.d. neutralised by 1 c.cm. of serum.

The antibacterial antibody content of the sera was determined by the agglutination test. A suspension of living organisms was used (10^9 organisms per c.cm.), as it had been found to be more sensitive than either a heat-killed or a formaldehyde-treated suspension, and it also overcame the difficulty of spontaneous clumping, which is common with preserved suspensions of *H. pertussis*. The mixtures of serum dilutions and suspension were incubated at 37° C. and the agglutination titre taken as the highest dilution of serum which gave definite agglutination in 4 hours.

RESULTS

The results are summarised in the table. Rabbits which received formaldehyde-detoxified extract acquired a high degree of immunity to the lethal and necrotising actions of the toxin, and the sera of these rabbits neutralised toxin in vitro to high titres. Immunisation with this extract by the subcutaneous route resulted in a distinctly better immunity to toxin than by the intravenous route, although there was no obvious difference in the response to the bacterial antigen with these two methods.

ANTIGENIC PROPERTIES OF PERTUSSIS PREPARATIONS

Rabbit number	Pertussis preparation used for immunisation	Active immunity of rabbits to toxin: Intradermal test No. of m.r.d. to which rabbits were immune	Active immunity of rabbits to toxin: Intravenous test No. of l.d. injected		Properties of rabbit sera: No. of m.r.d. of toxin neutralised by 1 c.cm. of serum	Properties of rabbit sera: Agglutination titre against suspension of *H. pertussis*
1	(*a*) Toxic extract detoxified by formaldehyde	256–512	5 S	A	5120	1 : 10,000
2		256–512	5 S		1280	1 : 10,000
3		256–512	5 S		2560	1 : 2560
28		128–256	50 S		2560	1 : 5000
29		256–512	25 S		5120	1 : 10,000
30		256–512	25 S		5120	1 : 10,000
31		128–256	5 S		NT	NT
73		1024–2048	2 S		10,240	1 : 1280
74		1024–2048	2 S		10,240	1 : 640
75		1024–2048	2 S		10,240	1 : 2560
43		32–64	5 S		640	1 : 10,000
44		16–32	5 S		640	1 : 10,000
45		32–64	5 S		320	1 : 5000
46	(*b*) Toxic extract detoxified by heat	< 1	NT		< 40	1 : 10,000
47		,,	,,		,,	1 : 20,000
48		,,	,,		,,	1 : 20,000
52	(*c*) Bacilli killed by formaldehyde	,,	,,	B	,,	1 : 80,000
53		,,	,,		,,	1 : 80,000
54		,,	,,		,,	1 : 40,000
70		,,	2 D 21 hr.		,,	1 : 40,000
71		,,	2 D 22½ ,,		,,	1 : 10,000
72		,,	2 D 13 ,,		,,	1 : 20,000
49	(*d*) Bacilli killed by heat	,,	NT		,,	1 : 80,000
50		,,	,,		,,	1 : 80,000
51		,,	,,		,,	1 : 80,000
59	None (two typical controls)	,,	2 D 20½ hr		,,	< 1 : 10
76		,,	2 D 18 ,,		,,	< 1 : 10

All rabbits immunised by subcutaneous injection, except Nos. 43, 44 and 45, which were given preparation (*a*) intravenously.

S = survival. D = death. NT = not tested. A = Resistance to larger doses not tested. B = 0·1 c.cm. of each of these sera failed to neutralise 4 m.r.d. of toxin; smaller doses of toxin not used.

Rabbits immunised with heated extract, heated bacilli or formaldehyde-treated bacilli showed no active immunity to the necrotising action of toxin, and their sera did not contain any detectable antitoxin. Moreover, 3 rabbits immunised with formaldehyde-treated bacilli all died after intravenous injections of only two lethal doses of toxin. All the preparations stimulated the production of antibacterial antibody, as shown by the agglutination test. In general, higher antibacterial titres were obtained with the sera of the rabbits which had received suspensions of whole bacilli, killed by heat or formaldehyde.

DISCUSSION

These experiments have shown that an extract of *H. pertussis* detoxified by formaldehyde is able to stimulate the production of antitoxin and antibacterial antibody in rabbits. They have also shown that the antigenic property of the toxin is destroyed by heating at 56° C., and that therefore in the preparation of extract high temperatures must be avoided. It is not known why toxin extracted from the bacillus behaves as an antigen while the same amount of toxin present in, or attached to, the bacterial cell does not. It may be that when the toxin is part of the bacterial cell it is present only in a relatively small amount compared with the bacterial antigen, and that the immunising mechanism of the rabbit is preoccupied by and responds mainly to the bacterial antigen rather than to the toxin. Teissier and his collaborators, who were also unable to obtain antitoxin by using a formaldehyde-treated suspension, suggested that the killed bacilli, when injected into animals, were ingested by the leucocytes which destroyed the toxin so that it was incapable of acting antigenically. Flosdorf and others (1941), on the other hand, state that formaldehyde-treated whole bacilli do immunise rabbits against the dermonecrotic action of toxin, but they quote no experiments to show whether the sera of such rabbits contain antitoxin.

The pertussis vaccines which have hitherto been used in the prophylactic treatment of whooping-cough have been made from whole bacilli, killed either by heat or by chemical reagents, such as phenol or 'Merthiolate,' which also render them non-toxic. The experiments reported in this paper suggest that, as the modified toxin contained in these vaccines is part of the bacterial cell, it is unlikely to behave antigenically, so that such vaccines probably produce antibacterial antibody only. Vaccines which have been made from bacilli killed by heat do not, indeed, contain any antigenically active toxin, but it is not yet known what effect phenol or merthiolate may have on the antigenic properties of the toxin.

So far, an extract of disintegrated *H. pertussis*, detoxified by formaldehyde, is the only preparation demonstrably capable of producing a serum which is both antitoxic and antibacterial. Whether the protection against whooping-cough obtainable by using such a preparation would be more complete than that which is afforded by the antibacterial antibody evoked by the ordinary vaccines is a question which can only be answered finally by clinical trials. It may be more advantageous to use not merely the extract treated with formaldehyde, but a vaccine containing both extract and whole bacilli, since the experiments reported here have shown that an antibacterial serum of higher potency is obtained from whole organisms than from extract. There is, however, the possibility that the addition of bacilli to the extract may interfere with the antigenic property of the toxin, and whether such interference would occur is being investigated. In view of the potency of pertussis toxin and its lethal and necrotic properties, one would suppose that it might be a factor in establishing infection by damaging tissue in advance of invasion, and that antitoxic immunity would therefore have a prophylactic value. This supposition is supported by the recent work of Strean and others (1941), who are of the opinion, based on clinical results, that pertussis toxin can be used to test susceptibility of children to whooping-cough in the same way as Schick toxin is used in diphtheria. These workers have also obtained results which indicate that serum containing pertussis antitoxin, given therapeutically, has a beneficial effect on the course of the disease. It will be interesting to see whether these preliminary results are confirmed on a larger scale. If so, there will be no reason to doubt the importance of

pertussis toxin, and good grounds for believing that something would be gained in prophylactic treatment by stimulating the production not only of antibacterial antibody but also of antitoxin.

SUMMARY

Experiments have shown that a toxic extract of *H. pertussis*, obtained by disruption of bacilli by physical methods, when detoxified with formaldehyde is capable of producing antitoxin and antibacterial antibody on injection into rabbits. A suspension of whole bacilli treated with formaldehyde did not act in the same way, but only gave antibacterial antibody, as did heated bacilli and heated extract.

It is suggested that any investigation into new types of vaccine for prophylactic immunisation against whooping-cough should take into consideration the significance of the toxin in infection and the value of the toxoid as an immunising agent. By using a vaccine capable of stimulating the production of antitoxin in addition to antibacterial antibody a more complete protection may be established than that which has hitherto been obtained.

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CTAB: A NEW DISINFECTANT AND CLEANING AGENT

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THIS paper reports some investigations into the behaviour of cetyltrimethylammonium bromide (called hereafter CTAB), one of a large group of synthetic detergents widely used in industrial processes. The group may be divided into two categories, depending on whether the alkyl radical carries a positive or a negative charge. CTAB belongs to the first category, called by Kuhn (1940) the "invert soaps," and by Baker and others (1941) the "cationic detergents"; they are powerful bactericidal agents, and were described by Domagk, who worked with a commercial preparation known as 'Zephirol' (in England 'Zephiran' Bayer). Zephirol is a mixture of a number of these cationic detergents in an odourless, colourless and faintly alkaline solution, and it is said to be harmless when applied to the skin (Domagk 1935). Kuhn and Bielig (1940) pointed out that the antibacterial properties of the cationic detergents greatly exceeded those of their anionic counterparts. They give details of the behaviour of the cationic detergents towards proteins, enzymes and living cells. Baker and others (1941) further investigated the bactericidal properties of a number of these substances, and examined over 15 commercial preparations. They confirmed that the cationic group was much more active than the anionic group of detergents, and that the latter was unable to destroy gram-negative organisms. The cationic group destroyed such organisms but required higher concentrations than those needed to kill the gram-positive bacteria. Baker and others also showed that the bactericidal power of these detergents was inhibited in the presence of certain phospholipids.

The substance CTAB used in these experiments was obtained from Imperial Chemical Industries Ltd., and the crude preparation was employed. This is a brown greasy powder that readily dissolves in warm water to give a clear solution with a distinct fishy odour. The smell is certainly not pleasant, but it does not cling to the skin after the solution has been used, nor does it hang about in rooms where the preparation has been used for cleaning. A 1% solution of CTAB is neutral, feels soapy to the touch and is not painful when applied to raw surfaces. It precipitates serum proteins, and is not precipitated by calcium. There is no evidence that tissue damage follows its application to raw surfaces, but a 1 : 1000 solution will rapidly destroy leucocytes in vitro; the cells are completely broken up.*

The work described below is an attempt to assess the power of CTAB to destroy bacteria under conditions likely to be met with in hospital practice. A 1% solution was used almost entirely, because this is far above the minimum needed to kill bacteria in vitro, and at this concentration the substance is an excellent cleansing agent for skin, greasy bowls and so on.

RESULTS

Action on normal skin.—A number of tests were carried out to see whether solutions of CTAB would remove bacteria from normal skin. An area of the forearm 6 in. by 4 in. was marked out, and a wool swab soaked in broth was rubbed over the area for a minute, and then dropped into 100 c.cm. of broth. The same area was then cleaned by rubbing it for 3 min. with fresh swabs soaked in 1% CTAB. The swabs were rubbed vigorously and rapidly over the skin so as to obtain a good lather. The arm was held under the running tap for a minute, in order to remove excess of the CTAB, and swabs soaked in broth were again rubbed over the area for a minute and transferred to broth as before: 1 c.cm. of the broth was then transferred to 10 c.cm. of molten agar, and a plate poured from this. This follows the technique described by Colebrook (1930), and eliminates the possibility of carrying over enough of the disinfectant on the second swab to inhibit the growth on the plates. The counts from areas of the arm before and after washing with CTAB were as follows:

Before ..	363 ..	431 ..	240 ..	38 ..	34
After ..	2 ..	9 ..	0 ..	2 ..	0

From the work of Price (1938) it can be assumed that the simple rubbing of the skin with the broth-soaked swab would not materially reduce the count from a similar swab taken a few minutes later.

Sterilisation of the hands is clearly a more difficult problem than that involved in the tests just described, owing to the presence of the numerous skin folds round the nails, &c. Colebrook's technique was again adopted, the hands being swabbed for a minute with wool swabs soaked in broth, and the swabs then dropped into 100 c.cm. of broth. The hands were then washed for 5 min. with wool soaked in 1% CTAB, and a good lather was worked up. At the end of this period the hands were rinsed for a minute under the tap, and swabs again taken as before the washing. Cultures and plates were made as before. The number of colonies per c.cm. of broth were:

Before ..	1410	109	625	415	79	547	159
After ..	150	17	133	82	9	140	21

In further experiments the hands were washed in the same way, but the rinsing was not so thorough. The hands were then dried on a sterile towel and sterile surgical gloves were donned. After periods of 1½–2 hours the gloves were removed and the hands were swabbed as before. The counts were:

Before ..	29 ..	81 ..	21 ..	200 ..	220 ..	86
After ..	8 ..	10 ..	3 ..	13 ..	18 ..	19

The experiments indicate that the reduction in the bacterial count was well maintained for at least 2 hours.

Action on wounds.—Over a period of several months a 1% solution of CTAB has been used to clean fresh and infected burns. In fresh burns it has been used in the place of ordinary soap and water for cleansing on the admission of the patient; it cleans the skin rather more efficiently than ordinary soap, and its application is not painful. It has also been found useful for cleaning infected burns, and it readily removes crusts, small sloughs and pus. It must be emphasised, however, that although the surface of the burn looked very clean, swabs taken before and after the cleaning yielded equally profused growths of whatever organism was growing there.† It is not clear why the rubbing of a granulating

*This test was carried out for me by Mrs. M. A. Jennings.
†I am indebted to Dr. R. L. Vollum for these results.

surface for a minute with a 1% solution of CTAB completely fails to sterilise it.

Bowls and baths.—A few experiments were carried out to see whether solutions of CTAB would sterilise, as well as clean, dirty and greasy bowls and baths. Small bowls (1 litre capacity), which were not grossly chipped, were smeared with 'Vaseline,' and then 20 c.cm. of a broth culture of streptococci was rubbed in with the grease; 100 c.cm. of 1% CTAB was next poured into the bowl, and the interior cleaned manually with wool swabs for ½–1 min. The bowl was emptied, and rinsed several times under the running tap to remove excess of the detergent. The interior of the bowl was quite clean and free from grease. This was done six times, and every time swabs taken from the sides of the bowls after they had been cleaned were sterile. Cleaning the bowls in the same way with soap and water reduced but did not eliminate the organisms. In another case a large bowl (3 litres capacity), which had been used on the previous day to collect infected dressings from a case of burns and had numerous small crusts of dried pus adherent to its walls, was cleaned with CTAB; 100 c.cm. of a 1% solution was poured into the bowl, which was cleaned manually for 2 min. with wool swabs and then thoroughly rinsed. Tests made before cleaning showed a profuse growth of staphylococci, streptococci, and *Pseudomonas pyocyanea*; after cleaning swabs taken from the sides were sterile.

An attempt was made to sterilise a bath. In the first instance a ward bath was examined after a patient with a colostomy had been given a bath. Tests from the sides yielded a profuse growth of staphylococci, streptococci, *Bacterium coli* and numerous spore-bearing saprophytes. The bath was then cleaned for 5 min.; wool swabs were rubbed all over the bath by two men, using altogether 250 cc.m. of 2% CTAB. The bath was next drained, and filled three times with cold water to remove excess of the detergent. Bacteriological tests from the sides after this revealed the growth of only a few spore-bearing saprophytes. In this case samples of the bath water used by the patient were removed, and various quantities of CTAB solution were added to parts of the sample. Cultures previously rich in the organisms enumerated above became completely sterile a few minutes after adding enough CTAB to bring the final concentration up to only 1 : 40,000.

On the second occasion the bath was filled with water at 105° F. and a bowl full of septic dressings was emptied into it, together with a number of pieces of vaseline gauze. The bath was stirred and left for 30 min., when the dressings were removed and the bath drained. Tests from the sides gave a prolific growth of staphylococci, streptococci and *Ps. pyocyanea*. The bath was then cleaned as described above for 5 min. by two men using 500 c.cm. of 1% CTAB, and drained and rinsed as before. The same tests from the sides showed the bath to be completely sterile.

DISCUSSION

It has been shown that CTAB, in addition to socially cleaning the normal skin, materially reduces the number of bacteria present on it. Clinical experience has shown it to be painless, and apparently harmless, when applied to raw surfaces. Its use should, therefore, provide a good substitute for the soap-and-water technique which is finding increasing popularity among surgeons called on to treat dirty wounds. It is probably as active a germicide as any of the disinfectants commonly used for preparation of the skin before operation, and could therefore replace spirit or the dye preparations favoured by some surgeons for this purpose. Its habitual use for cleaning the hands may not be without risk, for it has been reported that the frequent use of these "wetting" agents by industrial workers for cleansing the skin increases their liability to become sensitised to the chemicals with which they work (Schwartz 1940). But such dangers should not follow its occasional application on patients.

The solution is also useful for cleaning the dirty surfaces of infected burns, &c., and in my experience has proved much superior for this purpose to saline or 0·05% electrolytic hypochlorite. In one case of extensive burns CTAB was thus used several times a week for some months, and the normal skin round the lesions did not seem to be in any way injured by the applications.

Another important use for CTAB may be the cleaning and sterilisation of infected bowls and baths which are too bulky to be sterilised conveniently by heat. An example of this is the saline bath sometimes used in the treatment of burns, the sterilisation of which at present necessitates the use of abrasives and pure lysol. The cleaning process is tedious, and lysol is dangerous to handle. A useful safeguard in the treatment of infected cases in the bath would be the addition of a little CTAB to the water; as shown above, the substance is bacteriostatic in very high dilutions. It may be added that the cost of cleaning the bath by the method described was about ½*d.*

Further work should be done on this group of substances so that a preparation active against all varieties of bacteria, and free from any unpleasant smell, may—if possible—be made available. Such a preparation would probably be a mixture of a number of these compounds, for as Baker and his colleague have shown, they vary appreciably in their activity towards different organisms.

SUMMARY

Experiments with solutions of cetyltrimethylammonium bromide (CTAB), a cationic detergent, have shown it to be capable of materially reducing the number of bacteria on normal skin, and of completely sterilising dirty and greasy bowls and baths.

Clinical uses for this substance are suggested, since its application to normal skin and wounds seems to be without danger.

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MIDDLE MENINGEAL HÆMORRHAGE AFTER HEAD INJURY WITHOUT FRACTURE OF THE SKULL

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IT is common teaching that extradural bleeding from the middle meningeal artery after head injury is invariably associated with fracture of the skull. Peet (1940) in a recent monograph states in italics: "A linear fracture passing obliquely forward and downward from the parietal region toward the middle fossa is shown by the X ray." Munro and Maltby (1941) in reporting their observations on 44 cases write: "We have yet to see an extradural hæmatoma in the absence of a fracture of the bone in the immediate vicinity of the bleeding point—providing an adequate search for the latter has been made." McKenzie (1938) concedes that cases have been described without fracture, but says: "These cases are so rare that the absence of a linear fracture in good bilateral radiographs is strong evidence against the diagnosis of an extradural hæmorrhage." We are therefore reporting two examples of middle meningeal hæmorrhage, both of which occurred with an intact skull.

CASE-RECORDS

CASE 1.—An army driver, aged 30, was in a lorry which overturned on March 14, 1941, but he was not hurt. On the next night he went to a party and probably drank excessively; there was some question of his having been struck over the right ear, but he was able to return to his billet alone. Next morning, March 16, he could not speak properly and complained of headache and of weakness of his right arm. He was thought at first to be suffering from a "hangover," but later he became drowsy and incontinent of urine.

On the 17th he was admitted to the Radcliffe Infirmary. Though drowsy he coöperated on examination. No

evidence of external injury. Moderate nominal aphasia, with considerable weakness of the right lower face and of the right upper limb. Tendon jerks increased in the right limbs, abdominal reflexes absent on the right side, and both plantar reflexes extensor. Pupils equal in size and reacted normally. No papillœdema. Pulse-rate 70 per min., blood-pressure 105/70 mm. Hg. Serial X rays of the skull did not show a fracture, but showed a slight shift of a calcified pineal gland to the right. Lumbar puncture yielded clear cerebrospinal fluid (cells 2 per c.mm., protein 25 mg. per 100 c.cm.) under a pressure of 120 mm. of water. Electroencephalography revealed a large silent area over the lateral aspect of the left hemisphere; elsewhere over both cerebral hemispheres there were abnormal high voltage waves with a periodicity of 1–2 a second. A diagnosis of subdural hæmatoma was made, but exploration of the subdural space through burr holes placed over each parietal eminence and in the left frontal region did not reveal a hæmatoma. The intracranial tension did not seem to be raised, for on opening the dura the brain fell away from the skull.

His clinical state remained unchanged, and the possibility of a hæmorrhage into an intracranial tumour, or of an intracerebral hæmatoma, was considered. On March 19 ventriculography revealed a well-marked shift of the whole ventricular system to the right without deformation of the ventricles. Under local anæsthesia a left frontal scalp flap was reflected. The skull showed no fracture. A burr hole in the temporal fossa disclosed an extradural hæmatoma 2·5 cm. in depth and 10 cm. in diameter. The opening in the skull was enlarged and the clot removed with scoop and sucker. Brisk arterial bleeding was encountered from the middle meningeal artery and was controlled with endothermy. The wound was then closed. Rapid improvement in the patient's condition followed this operation, but he was left with a very slight permanent weakness of his right arm and leg and a slight hesitancy of his speech. Air-encephalography performed 3 months later showed a slight enlargement of the left lateral ventricle without deformity of its outline or shift of the ventricular system. In July, 1941, 4 months after his injury, he returned to his unit after sick leave, but he was unable to cope with the rigours of Service life. He developed troublesome headaches and was invalided out of the Army in November, 1941.

CASE 2.—A schoolgirl, aged 12, fell off her bicycle about noon on Sept. 24, 1941, but picked herself up and rode home; 2 or 3 hours later she developed a severe generalised headache and shortly afterwards became drowsy and incontinent of urine. She was admitted to the Radcliffe Infirmary 30 hours after her fall. She was then very drowsy, though she could be roused with difficulty. On waking she answered questions clearly for about half a minute before turning over on to her side and going to sleep again. No marks of external injury. Positive neurological signs included bilateral ptosis, defective upward movement of the eyeballs, and a 3rd cranial nerve palsy on the right side, almost complete with the exception that the right pupil, which was more dilated than the left, reacted to direct and consensual light stimulation. Both optic discs were normal. No definite weakness of the face or of any of the limbs, but the tendon reflexes of the left arm and leg were a little brisker than on the right side and the left abdominal reflexes were absent. The left plantar response was extensor and the right plantar response sometimes extensor and sometimes flexor. Pulse-rate 60 per min., blood-pressure 125/80 mm. Hg. Serial X rays of the skull did not show any fracture or other abnormality. Lumbar puncture released clear fluid (cells 3 per c.mm., protein 30 mg. per 100 c.cm.) under a pressure of 190 mm. of water.

Subdural hæmorrhage was diagnosed, but exploration of the subdural space through biparietal burr holes made under local anæsthesia did not reveal a hæmatoma. The brain however bulged through the openings made in the dura. A small vertical incision was then made in the right temporal fossa and carried through scalp and muscle to the bone (M. A. F.). The skull was intact but transmitted the dark colour of an underlying extradural hæmatoma which was exposed by a craniotomy opening 5 cm. in diameter. The clot was between 4 and 5 cm. thick and extended from the frontal pole backwards for 13 cm. It was removed with the sucker. Profuse bleeding was encountered from a point on the anterior branch of the middle meningeal artery about 5 cm. from the foramen spinosum and was controlled with endothermy. The wound was then closed. After operation the patient improved, slowly at first, remaining drowsy for a few days. Recovery subsequently quickened and after 10 days she was free of all abnormal neurological signs. When examined 3 months later (January, 1942) she had been back at school for a month and was symptom-free.

DISCUSSION

These 2 cases are examples of middle meningeal hæmorrhage with delayed onset of symptoms. The correct diagnosis was not made when they were first seen mainly because of the modern dictum that all cases of extradural hæmorrhage are associated with fracture of the skull. Similar cases have been recorded occasionally (Keith, quoted by McKenzie 1938, Turner 1941, and others) but the fact that they occur has not been realised sufficiently in recent years. In 1886 Jacobson, in his classic description of the syndrome of middle meningeal hæmorrhage, wrote: "While in the great majority of cases the skull is fractured, and the middle meningeal or one of its chief branches laid open where the fracture crosses the vessel, the existence of a fracture is not necessary for the production of middle meningeal hæmorrhage." He collected 71 cases, in 3 or possibly 4 of which there was no fracture.

No better explanation has been given of the mechanism responsible for the extradural hæmatoma in these cases than the following, put forward by Sir Charles Bell in 1816 and quoted by Jacobson. "It is extraordinary that anyone who has ever raised the skull-cap in dissection, and felt the strength of the universal adhesions of the dura mater to the lower surface of the bone, could for an instant believe that the arteria meningea media has the power of throwing out its blood, to the effect of tearing these adhesions from the entire half of the cranium! . . . Strike the skull of the subject with a heavy mallet: on dissecting, you find the dura mater to be shaken, at the part struck. Repeat the experiment on another subject, and inject minutely with size injection, and you will find a clot of the injection lying betwixt the skull and the dura mater, at the part struck, and having an exact resemblance to the coagulum found after violent blows on the head. I imagine this is conclusive. . . ."

We wish to thank Prof. Hugh Cairns, who operated on case 1, for his advice and assistance with this paper, and Squadron-Leader Denis Williams for the electroencephalography report.

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Medical Societies

MEDICAL SOCIETY OF LONDON

The Return to Work

A RECENT meeting of the Medical Society of London considered that most urgent question, how to avoid the wastage of man-power due to physical injury, or in other words how to make the best use of the services of those who by reason of such injury may be unable to resume their former work. Three points of view were put by Mr. H. E. GRIFFITHS, who has been largely responsible for the organisation of the Albert Dock Hospital; Colonel F. D. HOWITT, who has had great experience of physical medicine; and Dr. D. C. NORRIS, a member of the executive committee of the Queen Elizabeth Training College for the Disabled (Leatherhead).

Mr. Griffiths had no use for the scheme to send young men for a year or so to a university in order to give them a taste for higher education before being called up for military service. Unless we were prepared to give up such luxuries as academic distinctions, there would be no higher education for us for long enough. Rehabilitation must be studied as an immediate means of increasing man-power. Doctors were too much inclined to think in terms of an imaginary "normal" type, any deviation from which implied some reduction of industrial efficiency; in fact, only one occupation required perfect anatomical integrity—that of artist's model. Most work could be done with half the normal range of joint movement; a navvy could carry on with complete ankylosis of one

shoulder. The wide variation in the risk of injury in different occupations was reflected in the rates of premium charged by insurance companies covering employers' liability—e.g., 2*s.* 6*d.* % for a milliner or musician, against 250*s.* % for a demolition labourer.

Most of the disabilities which prevent a man from getting back to work are not the direct and necessary result of the original injury, but arise during treatment; thus, he may have a limb in which the bone has united firmly in good position, but the muscles are wasted and the joints stiff. Such complications may be avoided. A man undergoing training under medical supervision for heavy work needs more food than is usually provided in a hospital. Mr. Griffiths concluded by asking eminent surgeons to leave their gastrectomies and thyroid excisions to their houseman, and to concentrate on the treatment of minor injuries.

Colonel Howitt deplored that medical students are not adequately taught about physiotherapy, so that few doctors know how to prescribe such treatment. After the last war there was a great development of occupational therapy in America and elsewhere, much less in this country. In the Army the educational corps had given attention to the problem how to help patients in hospital to spend their time profitably, and physical training centres had been organised to upgrade substandard recruits—how to maintain good posture, how to walk, how to lift weights. Exercises were best carried out by teams, introducing an element of collaboration, with which competition might usefully be combined.

Dr. Norris showed photographs, models, and a film of the training college for the disabled at Leatherhead where there is accommodation for over a hundred cripples, drawn from special schools and from hospitals all over the country; three-quarters of the beds have now been reserved by the Ministry of Labour, and training is carried on in a variety of trades, including engineering, welding, spray-painting (one of the few occupations in which a one-armed man can do really well), gardening, cooking, carpentry, and clerical work. The aim is to select a course of training that will fit the patient for a job in which he can compete on equal terms with uninjured workers. There is liaison with employers who have already taken these trainees and with their help training can be directed towards a particular job into which the man can be drafted when he has completed his training, and passed any test usually applied to entrants—e.g., the Admiralty examinations for metal workers or welders. The film showed trainees assembling for fire-drill, working in the engineering and welding shops, and enjoying football and cricket. Two boys, both minus a lower limb, were putting up a lively boxing match.

In the discussion which followed a plea was made for closer contact between doctors and industry, and a more intelligent selection of workers for particular jobs. Sir James Walton agreed that surgeons should consider how best to further national war effort; he emphasised the importance of securing the right type of director for a rehabilitation centre.

Reviews of Books

The Universal Constant in Living

F. MATTHIAS ALEXANDER. London: Chaterson. Pp. 270. 15*s.*

THE inhibition of a habitual mode of action and its replacement by a consciously planned new mode is extremely difficult, and, according to Alexander, is not made easier by the fact that our proprioceptors mislead us in the process. Many respected medical men testify to the success of Alexander's technique in overcoming this difficulty, thereby making life livable for many who would otherwise have been incapacitated. He claims that he does not attack the fault (such as stammering or faulty posture) directly, but that by inculcating a new manner of "use" of the whole "self" he so improves the person's physical and mental relationship to his environment that the fault disappears incidentally. Efforts to achieve the end without a fundamental change in the "use of the self" can at best be only partly successful; and he criticises conventional systems of improving physical fitness, teaching proficiency in games, correcting deformities, curing psychophysical disorders like stammering, and even diagnosing diseases. Faulty "use of self" is almost universal, but can be replaced, not without difficulty, by a proper use. Alexander claims to have discovered a general law of self-use as distinct from a successful method of retraining individuals to overcome specific faults; and at least one eminent philosopher and a sprinkling of scientists and other celebrities believe that his claim is justified. This book, however, while successfully conveying the idea, excites rather than satisfies our curiosity regarding the actual evidence.

Marketing and Sale of Medicines

H. E. CHAPMAN, barrister-at-law. Bedford: Henry Burt and Son. Pp. 169. 7*s.* 6*d.*

THIS book on the law of medicines usefully summarises provisions which have been greatly changed by the Pharmacy and Medicines Act, 1941. The successful compromise between the Treasury (which had undertaken to repeal the curious old medicine duties), the Home Office (interested in controlling the sale of poisons), the Ministry of Health (securing at last some restriction of the abuses of advertising remedies for certain diseases) and the distributive traders (whose special training was worth encouragement in the public interest) has introduced complications which make guidance desirable. Mr. Chapman is a barrister who is also a member of the Pharmaceutical Society and the general secretary of the Proprietary Articles Trade Association. He writes not so much for those who prescribe and dispense medicine as for those who manufacture, advertise, pack, label and sell it. For these it should prove a trustworthy and reasonably comprehensive manual.

Treatment of the Patient Past Fifty

ERNEST P. BOAS, M.D., associate physician, Mt. Sinai Hospital, New York City; assistant clinical professor of medicine, Columbia University. Chicago: Year Book Publishers; London: H. K. Lewis. Pp. 324. 22*s.*

WE have suggested already that geriatrics hardly deserves to be developed into a specialty, though it doubtless needs fresh study in these days when the young become fewer and the old more numerous at a startling rate. Dr. Boas's book bears this out. In the short opening chapters he distinguishes the physical and mental processes of ageing from those of disease. Arteriosclerosis, he argues, is a pathological process, not an involutive one. He points out we know nothing of the mechanisms that control ageing except that there is a potent hereditary factor. Of the causes of arteriosclerosis, coronary disease, senile emphysema, essential hypertension, and the like, we know still less; the wear and tear of modern life is not a factor in bringing about their apparent increase in incidence; this, he thinks, is simply due to the fact that modern hygiene, by reducing the death-rate from infections at earlier ages, has lengthened the average duration of life, and thus allowed the degenerative diseases to develop in many who would otherwise have died young. The major problem in the management of the ageing patient, indeed of the ageing subject, he finds to be the social problem of providing him with work commensurate with his powers, and so keeping him in active functional relationship with society. The minor problems of his altered needs in the way of diet, sleep, rest and exercise are not difficult. Otherwise the book is a systematic account of those diseases which are common in the patient past fifty, differing little in scope from the corresponding parts of a good standard textbook. But it is well done, in a beautifully simple clear-cut style, modern in outlook, unencumbered by superfluous detail. Where the elderly patient's reactions to disease, as in tuberculosis and pneumonia, are significantly different from those in younger people this is duly emphasised. It is of interest that sulphapyridine is not mentioned: sulphathiazole and sulphadiazine have ousted it in America. On the whole, then, the book is an excellent short presentation of its subject: but do we agree with the author that the chief task of medicine during the coming generation is the extension of the human life span? Surely it is the achievement and enrichment of health throughout life.

Dermatophytosis

THE general experience of dermatologists that infections such as "athlete's foot," "swimmer's itch," etc., due to *Epidermophyton rubrum* and *Trichophyton interdigitale,* are difficult to cure prompted an investigation into the fungicidal and fungiostatic properties of numerous drugs in the section of the Parke, Davis & Co. Laboratories devoted to the study of mycology. The practical outcome of this investigation was the introduction of MYCOZOL OINTMENT, which contains salicylic acid, mercury salicylate, and Chloretone, and produces rapid maceration and separation of the horny layers of the epidermis, thus exposing the fungus to its inhibitive fungicidal action.

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THE LANCET

LONDON: SATURDAY, MAY 2, 1942

RÔLE OF THE PLATELETS

THE substance variously known as thrombokinase, thromboplastin or cephalin, thought to be liberated by damaged blood-platelets and to a lesser extent by damaged tissue cells, is generally considered to be an essential component in the mechanism of blood-coagulation. According to MORAWITZ this substance reacts with prothrombin in the presence of calcium ions to form thrombin, while according to HOWELL it acts by neutralising antithrombin or heparin which normally is present in the blood and holds in abeyance the reaction between prothrombin and calcium. Although more recent investigations by MELLANBY,[1] FERGUSON [2] and QUICK [3] have modified our conception of the natures and rôles of some of the factors in the process of clotting, it is still widely accepted that the disintegration of blood-platelets is an essential preliminary to the process. The common observation that the coagulation of blood occurs readily in a glass vessel but is delayed in one coated with paraffin has been explained by the adherence and subsequent disintegration of the platelets in contact with glass, while in contact with paraffin which is not wetted by water their integrity is preserved. As long ago as 1912 however, NOLF [4] maintained that platelets were unnecessary, since plasma devoid of platelets and cells contained all the factors necessary for blood-coagulation.

LOZNER and TAYLOR [5] of Harvard have now described a series of experiments designed to determine the effect of various foreign surfaces on platelet-disintegration and blood-coagulation. Samples of human blood withdrawn in an oiled syringe were centrifuged in tubes made of a synthetic plastic named 'Lusteroid.' The resulting clear plasma, which on examination was considered to be free from platelets, was transferred to tubes made of glass, collodion, paraffin and lusteroid. In the glass tube coagulation took place in the normal time of 11 minutes, but in the other three tubes coagulation was delayed from 44 to 64 minutes. Subsequent experiments were conducted with human citrated blood. Plasma that had been centrifuged at slow speed, and was accordingly rich in platelets, was distributed into tubes made of the same four substances. After an hour platelet counts were equal in all four tubes, but on subsequent recalcification the plasma that had been exposed to the glass surface coagulated three times as quickly as that from any of the other tubes. A similar experiment with plasma that had been rendered free from platelets by high-speed centrifuging yielded like results. It was concluded that exposure of plasma rich in platelets to glass surfaces does not result in disintegration of platelets, and that the acceleration of coagulation resulting from exposure to glass must be due to some modification, probably of a physicochemical nature, of a constituent of the cell-free plasma. Further experiments indicated that the fraction of normal cell-free plasma which is involved in this foreign surface effect is the same euglobulin fraction which when added to hæmophilic blood produces a sharp reduction in its coagulation time.

If these conclusions are confirmed they will revolutionise our concepts of the rôle of the platelet in blood-coagulation. It may be questioned, however, whether the so-called platelet-free plasma was actually devoid of platelets, because LOZNER and TAYLOR admit that with their technique of platelet counting counts below 15,000 per c.mm. are without significance and accordingly samples of plasma yielding counts below this figure are considered platelet-free. It seems conceivable therefore that the disintegration products from quite small numbers of platelets may be adequate for the initiation of coagulation. The idea that blood-coagulation in vitro may proceed at normal speeds in the presence of only relatively small numbers of platelets is supported by the normal coagulation times encountered in thrombocytopenic purpura.

1. Mellanby, J. *Proc. roy. Soc.* B. 1935, **116**, 1.
2. Ferguson, J. H. *Amer. J. Physiol.* 1937, **119**, 755.
3. Quick, A. J. *Ibid.* 1936, **115**, 317.
4. Nolf, P. *Ergebn. inn. Med. Kinderheilk.* 1912, **59**, 275.
5. Lozner, E. L. and Taylor, F. H. L. *J. clin. Invest.* 1942, **21**, 241.

DEHYDRATION IN CHILDREN

RATIONAL treatment is largely a question of applied physiology, and sometimes half-made discoveries are applied with indecent haste to the treatment of the sick. This is particularly true of those aspects of treatment which have caught the imagination of the public or are being boosted by the manufacturing firms. There are many examples in the field of hormone therapy. The opposite may happen if the discovery is unspectacular and offers no chance of being turned to financial gain. The treatment of dehydration, particularly post-operative dehydration, is a case in point. We have known enough about water metabolism in health and disease for many years to devise a satisfactory basis for the treatment of those who are unable to retain fluid taken by mouth, or who have suffered from a forced loss of fluid from some gastro-intestinal disaster. Yet medical men were very slow to apply this knowledge. They found it hard to realise the magnitude of the losses by the lungs and skin and their effect on the rest of the water metabolism. Even when they gave enough fluid they continued to give it as intravenous normal saline without considering the effects of overloading the body with salt, until COLLER and MADDOCK,[1] and JONES and MORGAN [2] pointed out that, once the loss of blood or intestinal fluid had been made up, much better results were obtained by the administration of 5% glucose, or 4·1% glucose in 1/5 N saline. These solutions tax the kidneys much less and enable the body to maintain a much more normal serum chemistry. The effects of dehydration and of its maltreatment are more serious in children than they are in adults, but again there has been a lag in this obvious extension of JONES and MORGAN'S work. ARNOTT and YOUNG, on another page, have produced a simple and workmanlike formula, based on surface area and body-weight, for determining the fluid requirements of a dehydrated child. They also demonstrate the success which has attended their efforts to maintain a normal serum chemistry and show what may happen if simple precautions are neglected. This work, which is

1. Coller, F. A. and Maddock, W. G. *Ann. Surg.* 1933, **98**, 952.
2. Jones, F. A. and Morgan, C. N. *St. Bart's Hosp. Rep.* 1938, **71**, 83; *Lancet*, 1939, ii, 611.

really a logical extension of that of ALDRIDGE,[3] should greatly facilitate the efforts of those who are faced with the treatment of a dehydrated and acutely ill child.

VITAMIN STANDARDS

WHEN in the last war anything disappeared it had usually gone for the duration but in this one sooner or later it comes back. Now the *Bulletin of the Health Organisation of the League of Nations* has reappeared, and very welcome it is. When France fell, volume 9, no. 4 was being printed in Paris and had reached the proof stage where it had to be abandoned. After more than a year Monsieur GAUTIER was able to restart publication and the material was set up again at a press in Switzerland. The subject-matter itself is singularly appropriate to sustain the cause of the free nations on whose banner is written "Coöperation not Competition," for it is a monument of joint international work. The number is entirely taken up with questions of international biological standardisation, and four of the papers are concerned with the standardisation of vitamins; the secretaries of the vitamin B_1, D and E subcommittees of the Accessory Food Factors Committee all publish important communications. Squadron Leader MACRAE describes the experimental work which he organised to enable the vitamin-B_1 standard to be changed from the acid clay adsorbate to synthetic crystalline vitamin B_1. This change had been achieved by correspondence before the war but the experimental work is only now reported in full. It is interesting to look at the table of participants in the experiments; first comes OHDAKE of Tokyo, followed by DI MATTEI of Pavia, E. MERCK of Darmstadt and the I. G. Farbenindustrie, together with a great many non-enemies. In the scientific world coöperation persisted perhaps longer than anywhere else, even if the motive was only the fear of missing something worth having. The papers on vitamins D and E represent part of the work of preparation for a meeting of the international conference on vitamin standardisation which was planned for November, 1939, and never held. The advisability of substituting vitamin D_3 for vitamin D_2 as international standard of vitamin D was to have been discussed at the conference, and a comparison of the antirachitic potency of the two substances was therefore organised by Dr. K. H. COWARD and carried out in nine British laboratories. The result confirmed the exact equivalence at 40,000 IU per mg. of the two substances for combating rickets in rats. The section on vitamin E is perhaps the most important because it reports the experimental work undertaken to test the suitability of synthetic tocopheryl acetate for adoption as international standard of vitamin E, and goes on to announce its adoption and issue. To launch a new international standard in war-time is a noteworthy achievement. Great Britain is fortunate in having at her disposal nearly half the personnel of the International Conference and of being able to consult other members in America. With this substitute for the conference it has been possible to launch the standard provisionally in the anticipation that its position will be regularised when the postponed conference eventually meets. It is good that this bit of reconstruction has been tackled now and not shelved indefinitely.

3. Aldridge, A. G. V. *Arch. Dis. Childh.* 1941, **16**, 182.

BIRCH, BENCH AND EBULLIENCE

THOSE who have to do with young offenders are not unduly disturbed by the increase in delinquency which has been noted in this war as in others. At a conference convened last year by the Middlesex county council a committee was appointed to study factors responsible for the increase, and to advise upon them, and their report has now appeared.[1] Evacuation, lack of home discipline, absence of fathers on service and of mothers at work, broken homes from other causes, interrupted schooling, lack of occupations for leisure hours, high wages for those old enough to work, an unsettled excited state and a desire for adventure fed by stories of the exploits of fighting men are causes enough to provoke reckless behaviour even in a steady boy. The Home Office has estimated that delinquency in children under 14 was 41% greater in the first year of the war than in the previous year; in the 14–17 age-group the increase was 22%; but even so the great bulk of children never get into trouble: only 1 child in 90 appears in the courts as compared with 1 child in 120 before the war. Nor has evacuation meant all loss and no gain; in many country districts the villagers are taking pride in their foster children from the towns, and giving them good country standards of behaviour. Routine is a good steadier, and the committee would like to see school attendance better enforced; they also urge that since children can best acquire good standards of conduct if they receive sound religious instruction, the activities of the Sunday school should be widened. Education authorities, they think, should coöperate but not overlap with the probation officer; if both send visitors to the home of a child about to come before a court parents are apt to get the impression that a case has been prejudged before it is heard. Probation officers and school teachers should pool their knowledge; in Middlesex head teachers on a rota will attend the juvenile court, and they will be informed when a child in their school is placed on probation. The committee believe that remand homes should have blocks for observation, training and medical treatment; that there should be more accommodation in approved schools and a greater diversity of training there; and that the local authorities should be obliged to provide youth centres where all young people have the chance of joining clubs or other social organisations.

Younger magistrates, the committee suggest, should be more freely appointed to the petty sessional courts where they can get experience fitting them for juvenile court work. The committee do not believe in official birching—a view shared by Mrs. C. D. RACKHAM who, at a Eugenics Society luncheon on April 23, mentioned that there had been a tendency to revert to this discredited form of punishment. Most experienced magistrates, she said, had found that a boy punished in this way was nearly always back in the court again within a few weeks. She quoted the opinion of CYRIL BURT that birching nearly always makes the delinquent more furtive and more defiant. The commonest offences at present are thieving, and the sort of destructive behaviour that comes from too much energy with too little outlet; sexual and cruelty offences are few. The peak age of delinquency in boys seems to be 13. The juvenile courts, she pointed out, were capable of deciding whether a child had

1. Children who Stumble. Middlesex Guildhall, S.W.1.

committed the offence with which he was charged, but were not in a position to find out the causes of his behaviour. Thus theft might be an expression of hunger, greed, jealousy, spite, a desire to shine or to please, or of bravado; these emotions might have their root in too strict or too lenient a home, in poor health or ebullient spirits, or in broken family relationships. She too felt that better and younger magistrates are needed. For children of 8 life in a supervised foster home was better than in an approved school; there they would learn how to live in society as members of society. She also thought there should be small homes where borderline mental defectives could be sent; these children, unfit to battle with life but not dull enough to be certified, cannot suitably go to an approved school; they are thus often left to the care of the probation officer who, after all, cannot be constantly at hand. Yet even with our imperfect methods of dealing with them it seems that at least 80% of our delinquents recover and become good citizens. With widening interest in their problems and better measures for their care it should be possible to reclaim the remainder.

Annotations

LESS SMOKE NOW

THE Smoke Abatement Society are considering changing their name, for they rightly hold that post-war reconstruction is going to give us an opportunity not only to abate our reek but to abolish it. In the meantime soap rationing, as one of our peripatetics has lately pointed out, is bringing home to us the extravagance of our dirty ways. When we get round to completing the slum clearance scheme which Hitler has begun for us, we may be in the proper frame of mind to spend a little more to ensure that the old taunt—cleanliness may be next to godliness, but in Pittsburgh it's next to impossible—can never again be applied to our cities. But once the war is over we shall all be eager to get the place tidied up as soon as may be, and there is a danger that in our haste precautions against smoke will be forgotten. The society has therefore suggested some safeguards[1] which might well be adopted in advance. They propose first that all new installations of fuel-burning equipment, including industrial plant, should be approved by a competent authority. Smokelessness is more readily achieved in commercial buildings, such as blocks of offices, than in homes and factories, and they would not permit any open fires in new premises of this type. With the help of gas and electricity the need for open fires in the home has been greatly reduced and an adequate supply of smokeless fuel at a reasonable price could be guaranteed for the remaining open grates. The society also suggest that smokeless areas should be enforced in the centres of our great cities—Manchester had almost achieved this when war broke out. These reservations would serve as an inspiring example of amenity and cleanliness to the rest of the city. Town-planning schemes should give special attention to the zoning of industry and the establishment of industrial estates. The society recommend also that the possibilities of district heating should be explored, and an informative appendix to their memo describes the progress it has made in America and on the Continent. The New York Steam Corporation, for instance, in 1939 supplied 1927 consumers occupying 2105 million cu. ft. of building space with steam at a pressure of 100–150 lb. to the sq. in., enough to heat some 200,000 flats of 3–4 rooms each. The society also advocate the formulation of a national fuel policy. The rationing this summer of every kind of fuel may well be a landmark in this policy, as was the rationing of foodstuffs 25 years ago in a nutrition policy.

1. Smoke Prevention in relation to Initial Post-war Reconstruction, memo submitted by the National Smoke Abatement Society, Woodborough, Nottingham.

PSYCHIATRIC SELECTION IN AMERICA

OUR own attempts to devise a mesh through which only the psychologically stable can find their way into the Services have had their counterpart in America. An extract[1] from the annual report of the William Alanson White Psychiatric Foundation reviews progress since 1926, when a joint Army and Navy selective service committee was established; this body over ten years drew up a comprehensive plan for a national headquarters under which a medical division would determine policy, and supervise medical machinery and field operations. In 1938, however, rumours of war seem to have diverted the committee from their course, and they decided that the medical examiners on the local boards should only eliminate candidates with easily recognisable physical disabilities, leaving a more thorough examination to the Service doctors. In 1940 Lieut.-Colonel C. B. Spruit became medical adviser to the committee; he did not favour the idea of hurried medical inspections by the local boards, thinking this was not the sort of work to call out the voluntary coöperation of competent practitioners.

Legislation followed which established a Selective Service system under National Headquarters very much on the lines proposed by the joint committee in 1936, and an official volume on physical standards was circulated which made uniform classification of candidates possible. Meanwhile the Southern Psychiatric Association drew the Government's attention to the dearth of well-trained psychiatrists, and the White Foundation submitted a bulletin to the Selective Service system containing a plan for the psychiatric examination of candidates for military service. Discussions followed, as a result of which the War Department required induction boards to provide one psychiatric examiner for every 50 candidates examined daily. Seminars were then planned in order to unify standards among Army induction board psychiatrists and all selective service psychiatry examiners; these seminars were successful and well attended. Diagnosis and procedure were discussed in relation to patients falling into the following groups: I, the mentally defective; II and III, psychopathic and cyclothymic personalities; IV, psychoneurotics; V, schizoids and schizophrenes; VI, chronic inebriates; VII and VIII, organic nervous defects or diseases; and those—chiefly in groups IV and V—with psychosomatic disorders.

Much of the success of this part of the programme depended on the vigorous psychiatric advisory committee of the Selective Service system. This body now proposed that the state medical officers should arrange for one of the autumn meetings of each county medical society to be devoted to a study of the ways in which the general practitioner can recognise the candidates he would refer on psychiatric grounds. This, however, was not so easy to achieve; it seemed that many of the local board doctors were disgruntled. They disliked having their rulings upset by Army examiners, and being asked to explain by rejected patients whom they had previously passed. Moreover they resented the fact that their services were given freely while the Army induction personnel were being paid, albeit at a low rate. Certainly some odd situations had arisen: for example doctors varied greatly in their standards for rejection, especially when it came to teeth and mental or nervous handicaps. Then the regulations required that a rejected man should be given a copy of the report on his examination; and employers might wish to see this as evidence of rejection. When the report happened to run: "Constitutional psychopathic inferiority; sexual

1. Reprinted in *Psychiatry*, 1941, **4**, 440.

psychopath, voyeur, Peeping Tom," or when a foreman learned that one of his best labourers was feeble-minded, or when a college graduate was sent home with the label: "mental deficiency: imbecile" the situation was apt, as the annual report remarks, "to provoke something besides laughter."

This was partly overcome, however, by a circular letter from the surgeon general of the War Department, sent out in March, 1941, which brought diagnostic standards more into line. But at this stage before the liaison between Selective Service and the Army boards could become a working collaboration the proposal was put forward and has since been carried into effect that joint Army and Selective Service examinations should be arranged. The advancing interest in personality factors among doctors forming local boards must therefore have suffered a check; but this may well be counterbalanced by the convenience to recruits of a single in place of a dual examination, and by greater uniformity in psychiatric standards.

PROGNOSIS IN HEAD INJURIES

Pilcher and Angelucci[1] of Tennessee have analysed nearly 400 cases of acute head injury with special regard to the signs present during the first eight hours after injury. Their study demonstrates the difficulty of assessing the prognosis at this stage, for while many of the fatal cases had, for example, high temperature, abnormal respiration, compound fractures, pupillary abnormalities or severe paralysis these were also found in cases that recovered. Even a considerably raised systolic blood-pressure, a slow pulse-rate and a slow respiratory rate were of little value in prognosis. Signs of cerebral compression, in fact, were of little clinical importance from the point of view of recovery whereas signs of shock were of much greater significance. Most of the deaths took place within 24 hours of the injury; if these are excluded they totalled only 5·4% of all patients. Intensive dehydration treatment was given in only 3·5% of cases so that the figures supply no evidence about its value. As Pilcher and Angelucci point out, the small mortality found in an unselected series such as this makes it very difficult to assess the value of any form of treatment. They also emphasise the impossibility of classifying head injuries clinically in terms of pathology and advise a classification according to the duration of disturbance of consciousness; this corresponds roughly to what is widely used in this country under the term "duration of post-traumatic amnesia." It is therefore rarely possible to give an accurate prognosis or diagnosis from a single examination in the early hours after head injury. This study did not include the clinical course of the individual case as indicated by changes in pulse, temperature, respiration, degree of consciousness and neurological signs, and, though a single record is of little value, repeated observations of these changes are essential in the management of head injuries if the dangerous complications are to be recognised in their early stages.

THE NORMAL ELECTROCARDIOGRAM

SINCE Lewis and Gilder's[2] original paper in 1912 there has been a steady stream of investigations of the normal electrocardiogram, most of which have shown a considerable degree of agreement. The present war, however, with its mass methods of medical examination has given an opportunity for reconsidering the normal in many branches of medicine. For the electrocardiogram the last word seems to have been said by Prof. G. E. Hall and his colleagues,[3] who have seized the magnificent opportunity of studying the electrocardiograms of the first 2000 men enlisted for air-crew duty under the air-training plan in Canada. While only 27 of their records (1·35%) could be placed in the category which they describe as "textbook normal," the vast majority fell within the recognised limits of normality. They confirmed the finding of Chamberlain and Hay[4] that the upper limit of normality for the duration of the P–R interval must be placed slightly above 0·2 sec., for the Liverpool workers put it at 0·22 sec. Unfortunately the Canadian observers do not give a precise figure but they report that in lead 1 the P–R interval was greater than 0·2 sec. in 14 records, the corresponding figures for leads 2 and 3 being 31 and 38. They report a U wave 139 times in lead 1, 196 times in lead 2 and 16 times in lead 3. The discrepancy between these findings and those of Papp,[5] who reported that a U wave was present in 70% of normal records, is probably explained by Papp's observation that in only 5% of cases did it measure 0·5 mm. or more in height. Hall and his colleagues found 9 definitely abnormal records in their series, T_1 or T_2 being negative or bundle branch block being recorded. All their 2000 subjects had been passed as medically fit for flying. The 9 with abnormal records were carefully re-examined, as a result of which a few were found to have some degree of abnormality of the cardiovascular system; these men were not allowed to proceed with their training. The others were allowed to continue in spite of their abnormal electrocardiograms; it would be interesting to know how they stood up to the strain. Provided a correct sense of proportion is maintained the electrocardiograph can obviously be of great value in the detection of cardiac abnormalities, particularly in the case of Services, such as the RAF, where the highest possible standard of physical fitness must be maintained.

WHY BREAST-FEEDING FAILS

SOME years ago Dr. Margaret Robinson, studying the welfare-clinic records in Liverpool, found curious variations from year to year in the breast-feeding rate. She has now[6] returned to the problem with a more detailed analysis designed to study the cause of these variations. Preliminary classifications indicated that the position of the child in the family had no effect on the duration of breast-feeding and that the age of the mother did not appear to affect the feeding of the first child. The percentage who feed their babies for nine months was almost the same in mothers of 30–35 years (42%) as in the younger mothers (49% for the under twenties), thereby disposing of the "elderly primipara" myth. Further detailed analyses showed that the duration of breast-feeding was not affected by the size of the breasts, the return of menstruation or certain ailments of the mother such as rheumatic heart disease, simple thyroid enlargement, or the occurrence during pregnancy of pre-eclamptic symptoms. On the other hand there appeared to be more failures in breast-feeding among the "masculine" types and obese mothers, and severe degrees of morning sickness, pyelitis, breast abscesses and cracked nipple all played an adverse part in successful lactation. The size and character of the nipple, though not the size of the breasts, was of great importance in Dr. Robinson's group. Mothers with flat or small nipples were not good feeders but a baby could be successfully fed with a flat nipple provided that it was a "loose" one, in which when the baby chews with its gums on the outer edge of the areola the nipple is not retracted. This can be tested by squeezing the nipple with finger and thumb. With a loose nipple the digits come easily together and a squirt of milk comes out, whereas with a "tied" nipple a thick cord is felt. Tied nipples were very frequent among mothers with cracked nipples and breast abscesses—important causes of failing lactation. Dr. Robinson found that a series of 1000 mothers could be

1. Pilcher, C. and Angelucci, R. *War Med.* 1942, **2**, 114.
2. Lewis, T. and Gilder, M. D. D. *Philos. Trans. Roy. Soc.* 1912, **202**, 531.
3. Hall, G. E., Stewart, C. B. and Manning, G. W. *Canad. med. Ass. J.* 1942, **46**, 226.
4. Chamberlain, E. N. and Hay, J. D. *Brit. Heart J.* 1939, **1**, 105.
5. Papp, C. *Ibid.* 1940, **2**, 9.
6. *Arch. Dis. Childh.* 1942, **17**, 23.

classified into four types. These are in order of frequency: those who fed all their children for nine months, those who weaned all their children early, those who fully breast-fed the earlier babies but weaned the later arrivals early, and those who weaned the first babies early but fed later ones for the full period. It may be that endocrine and anatomical (nipple) patterns determine which type of mother a woman is likely to become, but it is also possible that breast-feeding successfully may be a matter of habit. It is gratifying that type-1 mothers formed the largest of Dr. Robinson's four groups (41% of the whole); the non-feeders came next with 24%. With all the advertising propaganda in favour of bottle-feeding it is surprising that so many mothers persist in their good habits. Many waverers must have been adversely influenced by the recent advertisement in a national daily which proclaimed a certain dried milk as "The best foundation for life." So long as this is permitted the voices of those who advocate breast-feeding are crying in the wilderness. Dr. Robinson's paper gives them something specific to cry about and one day perhaps they will be heard.

OXIDATION AND ANÆSTHESIA

SEVERAL of the commonly used anæsthetics in their ordinarily effective concentrations reduce the oxygen consumption of tissues, that of nervous tissue being reduced relatively more than that of other active tissues such as liver and kidney. There are at least three ways in which they might do this: by acting on the outer layers of the cell so as to prevent oxygen diffusing in; by inhibiting the enzymes which carry on the intracellular oxidations; by breaking a chain of intracellular chemical reactions through combination with one of the reactants which form the "links" of that chain. During the last ten years Quastel and his colleagues [1] have provided much experimental evidence that when oxidation is depressed it is in the second of these ways. More recently, Johnson, Brown and Marsland [2] have demonstrated that drugs like ether, chloroform, alcohol or procaine cause bacterial luminescence to "go out," and it is well established by the work of Dubois and of Newton Harvey [3] that the continued luminosity of those bacteria depends on reactions which involve the consumption of oxygen. Johnson, and his co-workers have found that if the "anæsthetised" bacteria are subjected to oxygen under pressure they glow again, despite the presence of the anæsthetic. They made these observations however not only with whole bacteria but also with non-living preparations which had been extracted from the bacteria —presumably preparations of enzyme and substrate. Thus they seem to have provided some pretty evidence in favour of the second of the possible explanations for reduced oxygen consumption. The fact that this reduction occurs does not necessarily prove that these anæsthetics act primarily by diminishing oxidation, although undoubtedly anoxia can produce narcosis. Interrupting the cerebral circulation for 6–8 sec. results in loss of consciousness. Simpson and Derbyshire [4] have found that in the cat cerebral anæmia for 20 sec. abolishes the usual electrical activity of the cortex, and that anæmia lasting 2–15 min. often produces irreversible changes in the cortex and medulla. Undoubtedly, too, the effects of anoxia can augment those of narcotics—thus the weak anæsthetic action of nitrous oxide can be reinforced by anoxia. But narcosis can be produced without a decrease in intracellular oxidation. According to Bülow and Holmes [5] the oxygen consumption of minced brain is unaffected by nitrous oxide or acetylene. Using the fertilised eggs of the sea urchin, Loeb and Wasteneys [6] showed that when narcosis was produced by chloroform, chloral hydrate, ethyl urethane or various alcohols the oxygen consumption was depressed by less than 20%, and that greater changes of oxygen consumption, unaccompanied by narcosis, could be produced merely by altering the temperature of the eggs. Winterstein [7] found that an amount of alcohol which depressed the central nervous system resulted in increased oxidation. Even anaerobic organisms can be narcotised, and anaerobic intracellular chemical reactions can be slowed by the actions of anæsthetics on the enzymes which ordinarily maintain their speeds.[1] Warburg and Weisel [8] showed that the relative potencies of members of a series of urethane derivatives in inhibiting the anaerobic reproduction and fermentation of yeast were nearly the same as their potencies in depressing the oxygen consumption of certain bacteria (*Vibrio metschnikovi*). Winterstein found that ascaris, which does not need free oxygen, can be paralysed by ether or chloroform. Veszi [9] has demonstrated that obligate anaerobic bacteria can be narcotised. It seems, therefore, that depression of oxidation is not an essential part of narcosis.

1. Quastel, J. H. *Physiol. Rev.* 1939, **19**, 135.—2. Johnson, F. H., Brown, D. E. S. and Marsland, D. A. *Science*, 1942, **95**, 38.—3. Harvey, A. N. Nature of Animal Light. Philadelphia and London, 1919.—4. Simpson, H. N. and Derbyshire, A. J. *Amer. J. Physiol.* 1934, **109**, 99.—5. Bülow, M. and Holmes, E. G. *Biochem. Z.* 1932, **245**, 459.—6. Loeb, J. and Wasteneys, *J. biol. Chem.* 1913, **14**, 517.—7. Winterstein, H. *Biochem. Z.* 1915, **70**, 130.—8. Warburg, O. and Wiesel, R. *Pflüg. Arch. ges. Physiol.* 1912, **144**, 465.—9. Veszi, *Ibid*, 1918, **170**, 313.

RADIOGRAPHY AFTER AORTIC INJECTION

THE demonstration of solid organs by radiography is often uncertain, but if an opaque medium is injected into the arterial tree the organs are thrown up in sharp contrast to the muscular background. Striking pictures can then be obtained, revealing alterations in size, position or contour of kidneys, suprarenals or spleen. In vascular neoplasms of the suprarenals or kidneys pooling of the opaque medium in the blood sinuses is said to be pathognomonic. The details of the technique of aortic injection is described by O. A. Nelson.[10] He gives three important basic requirements for the production of a good picture. The opaque medium must be concentrated; the injection must be completed within a few seconds; and the film must be exposed the instant that the injection is completed. A high degree of technical skill and close coöperation between surgeon and radiographer are essential. Hand-syringe injection is not quick or accurate enough, so the equipment includes a pressure apparatus for injection of the solution. Nelson uses an 80% solution of sodium iodide, of which 8–10 c.cm. is allowed to flow into the aorta. The X-ray machine, he says, should be able to deliver 500 milliamperes of current; and the Bucky diaphragm must be of the high-speed type, so that exposure can be made in $\frac{1}{4}$ sec. The patient receives 2 oz. of castor oil on the afternoon before the examination, and from that time is allowed only liquid nourishment. A preliminary film is taken to fix the position of the patient and make sure of the X-ray technique. The patient is anæsthetised with 'Pentothal Sodium.' He lies prone on the table, the left side of his back and chest is painted with iodine, and the needle, about 12 cm. long and of 18 gauge, is passed into the aorta by inserting it from the back close to and a few c.cm. beyond the body of a lower thoracic vertebra. For arteriography of the organs of the upper abdomen the twelfth vertebra is the guide. The needle is passed through the skin below the last rib and three finger-breadths to the left of the spinous process. The needle encounters the bone, and is then deviated slightly laterally to pass the vertebra. The stilet is removed, and the needle passed on a few c.cm. Blood comes through the needle as the aorta is punctured. The needle is advanced another centimetre, the X-ray technician makes ready to expose the film, the pressure apparatus is attached, and the outlet valve is opened and 8–10 c.cm. of the sodium iodide solution allowed to flow in. This takes a few seconds only. The exposure is made just before the valve is closed. The pressure

10. *Surg. Gynec. Obstet.* 1942, **74**, 655.

apparatus is detached and a few c.cm. of blood allowed to run out. The only complication Nelson has met is acute iodism in 4 of his patients. The symptoms have not been severe but it is undoubtedly a disadvantage and Nelson is looking for a more satisfactory contrast medium. The less concentrated media so far tried have been too weak to give good pictures. Injury to the aortic wall has not been a complication. Twice extravasation of medium has occurred, but without evidence of necrosis. On the whole, Nelson believes that untoward reaction and suffering are less frequent and less severe than after retrograde pyelography. The information obtained, he says, may be even more definite in some cases than that got by surgical exploration. Illustrations accompanying Nelson's paper show the use of the method in the diagnosis of a pancreatic cyst suspected of being a renal tumour; of a case of splenomegaly in which retrograde pyelography had suggested renal neoplasm; of a malignant tumour of the right suprarenal gland; of a cyst and a tumour of the kidney; of a case of hydronephrosis in which the opaque fluid injected for pyelography persistently returned into the bladder because the catheter could not pass the large cystic mass; and of a large renal calculus in which the arterial injection revealed a good blood-supply to the kidney cortex. Aortic puncture and injection of iodide is not to be lightly undertaken, but in the hands of the highly skilled it is clearly capable of yielding valuable results.

ADJUNCTS TO PERITONEOSCOPY

THE enthusiasts for peritoneoscopy have so far admitted that its value is limited by the inaccessibility of some parts of the abdominal cavity. An instrument devised by Joseph E. Hamilton overcomes some of the difficulties, and he has reported 31 cases in which he has used it.[1] There were no accidents in these cases, and he is pleased with the added scope which it has allowed him. The instrument—really two instruments in one—consists of a "manipulator," which is a blunt-tipped rod, and an insulated endothermy electrode. Both fit into the sheath of a small paracentesis trocar through an air-tight rubber nipple. Either instrument can be inserted through a small stab wound, separate from that through which the peritoneoscope itself passes, and can be guided by direct vision through the peritoneoscope. The rod is used to push impeding structures out of the line of vision, or to hook others into view. The electrode divides adhesions and opens benign cysts. The edge of the liver can, for example, be lifted up to uncover the gall-bladder. The fallopian tubes can be hooked from the depths of the pelvis by traction on the round ligaments, or the appendix raised for inspection. Hamilton has used the peritoneoscope in 16 cases of gunshot wounds and stab wounds of the abdomen with the purpose of determining the extent of the penetration of the missile and the need for immediate laparotomy. Prior to the use of the peritoneoscope it had been found that 12% of the abdominal operations undertaken in these cases had been unnecessary. The suspected area of peritoneum is tented inwards and inspected. Of the 16 cases, 7 revealed penetration and the remaining 9 none. The latter were spared laparotomy, because the peritoneum was shown to be intact. The differential diagnosis between acute cholecystitis and appendicitis has been made by direct vision in a doubtful case. The appendix was hooked up by the manipulator and found to be normal, while the inflamed gall-bladder was plainly seen. Salpingitis can also be revealed, and laparotomy for a mistaken diagnosis of pelvic appendicitis avoided. Hamilton finds that peritoneoscopy can determine definitely whether the spleen or liver is ruptured but that negative findings in a suspected case of rupture or perforation of the bowel are not conclusive. On two occasions attempts were made with the electrode to rupture small follicular cysts of the ovary, which by endocrine stimulation were producing severe menorrhagia. In one case the cyst was plainly seen and ruptured, with temporary relief of symptoms. One successful lysis of adhesions is reported. This was in a negress aged 44 with persistent pain beneath the right breast of almost incapacitating severity. All radiographic investigations had drawn a blank. Violin-string adhesions between the liver and anterior abdominal wall were seen by peritoneoscopy. Tugging on these produced the same "sticking" pain of which the patient had complained. The adhesions were divided under direct vision and the pain is said to have almost gone. Hamilton's technique, if proved safe, seems likely to extend the scope of peritoneoscopy.

1. *Surg. Gynec. Obstet.* 1942, **74**, 505.

ŒSTRONE AND ANTIBODIES

Von Haam and Rosenfeld[1] have studied the effect of œstrone injections on the rate of antibody formation in rabbits. For their antigen they used type 1 pneumococcus which had been passed through mice to increase its virulence before the vaccine was prepared. The immunisation was by the "four week complete system"[2] in which the vaccine is injected intravenously in increasing doses for four successive days and the process repeated four times during four weeks. When œstrone was injected throughout the period of immunisation the concentrations of specific agglutinins and of protecting antibodies in the serums were much higher than they were in control rabbits; also the rise in concentration in the experimental animals preceded that in the controls and lasted longer. These results were obtained by the injection of 1 mg. of œstrone into each rabbit every other day. This dose is, of course, high. If we assume that the dose necessary to sensitise the uterus of the female rabbit to the action of progesterone produces a physiological œstrogen concentration in the body, the dose used in these experiments is at least 50 times greater. This may not be important. In one experiment it was shown that a second exactly similar immunisation further increased the antibody content of the serum—but relatively more so in the controls than in the experimental rabbits. This suggests that the dose of œstrone employed was maximal. The experiments were carried out on both normal and castrated males and females and the response of the castrated animals appeared to be greater than that of the normals: the numbers, however, are insufficient to make this observation more than suggestive. At present there is no evidence as to the mode of action of the œstrogens in this connexion and Von Haam and Rosenfeld are careful to point out that the observation on rabbits should not be generalised to include other species. But the facts do fit in nicely with the increase in natural and acquired antibodies which has been observed during pregnancy.[3] This increase is highest in the latter part of pregnancy when the concentration of œstrogen in also highest. Whether this action of œstrone will prove to have therapeutic value or physiological significance remains to be seen.

1. Von Haam, E. and Rosenfeld, I. *J. Immunol.* 1942, **43**, 109.
2. Goodner, K., Horsfall, F. L. and Dubos, R. J. *Ibid*, 1937, **33**, 279.
3. Aycock, W. L. and Kramer, S. O. *J. exp. Med.* 1930, **52**, 457; Hudson, N. P., Cook, E. A. and Adair, F. L. *J. infect. Dis.* 1936, **59**, 60.

GASEOUS ANÆSTHETIC APPARATUS.—Mr. A. Charles King, who is known to anæsthetists as a progressive manufacturer of their apparatus, has produced a helpful handbook (London: Baillière, Tindall and Cox. Pp. 48.) on the care and use of anæsthetic equipment. Line drawings show how the various types of reducing valves and flowmeters work and clarify the chief features of the different forms of apparatus. This book answers many of the questions which crop up in the induction room.

In England Now

A Running Commentary by Peripatetic Correspondents

OUR medical planning study group seems to be enjoying its deliberations, judging by the readiness with which we all turn up at our regular meetings or agree to the holding of extra ones. We are a nicely representative team ranging politically from our bright red chairman through innumerable shades of pink to one or two pretty true-blue die-hards. These last are (or were) quite prepared to regard everything as all for the best in the best of all possible medical worlds. ("Surely the best doctors get the biggest practices and so make the most money. What's the matter with that?") However, they are now reading their pamphlets and seeing the light; they have even begun to make good and constructive suggestions. Harsh words are bandied across the table about state service with its passion for certificates and returns, its hierarchy of increasingly infallible authorities and its tendency to make its doctor-employee concentrate his energy on keeping on the right side of the man above him instead of devoting himself to his patients. Nevertheless, we have unanimously approved the principle of the health-centre—not necessarily state-controlled or financed it is true—and if that isn't progress I'd like to know what is. At present we are hammering out the several functions of the local and divisional health-centres. Some of us are vigorously opposed to the notion of periodic routine examinations of the apparently healthy which we think is conducive to neurosis, and, moreover, quite unable to do what it sets out to do—to reassure the patient that he is quite physically healthy. All the resources of a hospital, we think, might still be inadequate to such a task. On the other hand, we have no objection to the patient, especially the adolescent or young adult, calling and having an informal chat with his doctor from time to time on how to keep as well as possible. But only if the patient wishes it; there must be no compulsion.

* * *

The last wire was cast off, a few fussy tugs pulled and pushed till we were in mid-stream and then we slipped quietly and rather sadly down river and away. As the low coastline receded I leaned on the rail and thought about the events of the previous few months. How one day last autumn we had put just as quietly into this United States port to refit our ship after many thousands of miles of war-time service at sea. It was the first visit for most of us and we thrilled with anticipation as we made our way slowly towards our berth. All along the river were evidences of the enormous industrial capacity of the country, on a vaster scale than any to which we were accustomed. Huge chemical works, steel works in their massive grimness, and shipbuilding yards with new slips being built in groups of six or twelve and ship construction in progress on the first before the completion of the last—a very comforting sight. The initial hustle of the yard authorities was also impressive. No sooner had we berthed than officials swarmed on board to confer with us on the work to be done. Water, electric power, compressed air and telephones—not one phone but five—were quickly connected. It is true that our first impression of confident activity was tempered, as time went on, by realisation that the dockyard "matie" is the same everywhere—skilled and willing enough, but intensely jealous of his right to take time off, to indulge in protracted lunch periods and to lop off half an hour at each end of his working day either warming-up or clearing-up. The astronomical rates of pay of these workmen caused not a little comment from our penniless sailors whose working day was longer and at least as arduous. Still the work proceeded at a fair pace and we were given priority over certain United States vessels in the yard.

The yard itself was a revelation to those of us who were accustomed to the strictly utilitarian dockyards at home. It had blocks of large and airy shops divided by wide streets with trees and grass borders. There were canteens for the men, a recreation centre with clothing and other stores, a small cinema showing a different film each night, pool tables and bowls. There was also an officers' club inside the yard with dining and other facilities. This consideration for the well-being of the Service man struck me as being a fine thing. If we can combine efficiency and a degree of comfort for the men then let's do it; it is a policy which will pay dividends in the long run. If you put a man in uniform, reduce his income drastically, tax him heavily and increase the cost of living of his family, and then leave him to find his own amusements with what meagre funds remain in surroundings which even today are faintly hostile to a Service man you are sowing seeds of disaffection.

On our first "run ashore" we were struck by the frank interest of the passers-by in our uniforms, the tall clean buildings, the strict rectangular plan of the city—only possible where the main development has been comparatively recent—and the overwhelming hospitality of the civilians. The ratings couldn't walk about the streets for more than a few minutes without someone stopping them and inviting them home. There they were royally entertained and met more and more people who competed to entertain them in their turn, and these kind folk did not just invite the men to stiff dinner parties but took them into their homes and into their hearts. Once when I visited a sailor who was sick in a house ashore I was told by his hostess that her boy was away with the U.S. forces in the Pacific and so she had "adopted" our man; certainly nobody could have been kinder. The average sailor is a pretty shy chap but he bloomed in such surroundings, and from my duties as a censor officer I could tell that nearly everyone had a haven of this sort. The officers were made honorary members of nearly all the exclusive clubs in the city and suburbs (there was a weird class-consciousness which took some understanding), and were entertained to concerts, operas, society dinners and a host of other functions where many were asked to satisfy the American's love of after-dinner speaking. They had the option of wearing plain clothes and at times were almost obliged to exercise it continually so embarrassing was this spate of hospitality. It is even rumoured that one officer, when he entered a restaurant in uniform, was greeted by everyone rising and the orchestra playing "There'll always be an England." No restrictions were made on our movements, for no passports or other formalities were necessary and our identity cards passed us anywhere; all was made very easy.

The other doctor and myself were naturally interested in local medical affairs. We found a city of contrasts. There was an apparently acute public-health sense as evidenced by a low incidence of diphtheria—due partly to intelligent immunisation and partly to rigid quarantine rules—and cases of surgical tuberculosis were astonishingly few for a city of its size, largely I gather because of the efficient compulsory pasteurisation of milk. On the other side of the picture we find the appalling seasonal ravages of infantile paralysis, for which no-one can be reproached, a disturbingly high venereal-disease rate, a wealth of trauma, chiefly from automobile accidents which admittedly are more a sociological than a medical problem, and, most striking of all, the rivers which flow through the city disgustingly polluted with uncontrolled industrial effluent and sewage. We arrived after a summer of drought and the stinking mud left bare by the falling water levels was a reproach to any community. The medical population were enthusiastic members of many learned societies to whose meetings we were often invited. A programme published each week gave details of all meetings of medical interest and the attendances at these meetings were remarkable for numbers and enthusiasm. We were received with great courtesy and our views, though far from authoritative, were given polite attention by these doctors many of whom were the cream of the U.S. profession. Hospitals and teaching centres were thrown open to us, we were begged to attend and give talks to small groups at various towns round about. Visits were arranged to the great clinics such as Cornell and Johns Hopkins.

The medical school of the local university afforded us an opportunity of drawing rough comparisons between our system and theirs. The medical course itself seemed much the same as ours except that less stress was laid on the minutiæ of human anatomy and more on experimental physiology and bacteriology. It was interesting to observe the effect of the compulsory three or four years of general college education before beginning medical studies proper. These college studies take the student to a standard which, I am told, is slightly lower than an average English BA or BSc, and the students start their

medical studies at about 21, the age of graduation thus averaging 26–27. I gained the impression that the senior students and junior residents with whom I spoke were more men of the world, were able to converse more easily and had more outside interests than the average graduate from our universities. This self-confidence is no doubt enhanced by the frequent "seminars," at which the clinical clerk or dresser demonstrates his cases before a lecture theatre full of his contemporaries, and must answer a barrage of questions and comment. Curiously enough these same residents seem to be given a minimum of responsibility and even less opportunity to "try their hands." This is largely due to the numbers of clinical assistants and fellows who are always present and who take a large share of the minor work.

The hospitals impressed us enormously. Usually they were vast buildings run rather like chain-stores, with plenty of excellent equipment. The staffs were much larger than in our hospitals and were swollen by the clinical assistants already mentioned. Everything was very clean, very new and very thorough and gave an impression of comfortable affluence which seemed to me to be strangely foreign to a hospital, so miserably poor were the ones in which I had my training. The huge city hospital, though not quite so modern or lavish, did the bulk of the routine work and more than its share of the chronic cases, like the municipal hospitals do at home. The lot of the student nurse does not seem quite so hard as over here; her wages are better and she is not treated as a potentially naughty schoolgirl both on and off duty. In all these hospitals, and in the new naval hospital in particular, we were bombarded with probing, intelligent questions about the war and our professional experiences. The American wants above all to know what is going on and to prepare for eventualities in the *n*th degree.

It was interesting to observe the changes brought about by the Pearl Harbour disaster. Before then, in spite of a great bias in favour of the Allies, most Americans showed the appalling complacency which was once so apparent in England and which even now is seen at times. Many intelligent people, civilians and Service men, assured me before Dec. 7, 1941, that Japan was a loud-mouthed nonentity, that her warships and military planes were antique musical-comedy relics, and that her ideas of modern warfare were laughable. I was repeatedly told that, at a liberal estimate, Japan might last a few months in a war with the United States. I was proud of the opportunity of seeing a new America arise after Pearl Harbour, an America that was not afraid to impose drastic restrictions on labour and consumption from the outset, an America so full of possibilities that President Roosevelt's production ideals are no idle dream; above all, an America which is now "in it" and prepared to act.

I brought back a jumble of other impressions—of the incredibly beautiful tints of an American autumn; of telephone efficiency and courtesy; of a land abounding with dairy produce, fruit and greenstuffs, and making good use of them; of overheated buildings and public vehicles; of enlisted men driving their private cars in and out of barracks; of innumerable cafés and "diners" in all of which the food and fittings were scrupulously clean and speed of service was a major consideration; of bars and saloons open till all hours, and yet surprisingly little drunkenness on the streets; of the precocity of the children, particularly the girls who seem to be allowed a free hand from early adolescence; of patching up the few sailors who indulged in the inevitable fights when alcohol had increased their patriotism and natural belligerency while lowering their discrimination. No wonder we were sorry to go.

* * *

Now that Davis and I send out several thousand postcards every week we are getting to know where people live. You'd be surprised how many reside at Cosycot, Kosy Kot or Kosikot, and how many have at last found peace at Dunroamin, Dunlukyn or Dunrovin. (Davis maintains that the clergyman who lately changed his address to Dunluce was also breaking with his past.) Perhaps, gentle reader, you are yourself the householder to whom we write at Thyslldu, Hearamai, or Ersanmine? But I prefer to think of you, lyrically happy, at Harts Delyte (sic). Ovayonda is also romantic; but a bit on the gynæcological side.

Parliament

ON THE FLOOR OF THE HOUSE

MEDICUS M.P.

THE future hospital organisation of the country came under review last week in the House in the form of a debate on a supply vote for the Ministry of Health. The debate was initiated by Mr. McNeil, whose luck in the ballot for motions enabled him to table a comprehensive amendment. This amendment stressed the need for regional planning of hospital services and a recognition of the status and responsibilities of local authorities, and laid it down that independent schemes for the future building of hospitals should be discouraged as being inimical to a proper coördinated post-war plan. One point Mr. McNeil made was that the falling birth-rate should enable us to have a better hospital service after the war because of the decreasing numbers with which future services will have to deal. And he asked the House to get away from the ideas of the horse-ambulance of the past to the aeroplane ambulance service of the future, with which experiments have already been made in the Highlands and Islands of Scotland. Mr. McNeil said that the main reason for hope in the future "rests in the development of the Emergency Medical Service." Mr. Thomas Johnston, Secretary of State for Scotland, spoke of EMS hospitals in Scotland becoming "the nucleus of a great service, perhaps the backbone of a great organisation for a united attack on physical suffering" in the future, and this was quoted with approval with the addendum that the Minister of Health has "demonstrated" by his practice that it is also his hope.

This contention and this appraisement of the position of the EMS hospitals was not fully accepted by the House and there is indeed a difference in this respect between England and Wales and Scotland. But the EMS organisation has made its mark and much of it will be incorporated in the hospital system of the future. Nowadays few, if any, argue for the status quo in the hospital world. Indeed the status quo has been abolished beyond the possibility of reinstitution by developments since September, 1939. What Mr. McNeil had in mind was an extension of National Health Insurance to cover wife and dependants plus a statutory contribution to provide for hospital services up to the £420 income limit and beyond.

Mr. Messer, whose extensive experience of hospital administration in Middlesex entitles his views to careful examination, wished to enlarge Mr. McNeil's conception and said we should aim at a national health services standard. Provision of hospital accommodation and treatment should be designed strictly in regard to "the potential patient." The complexity of the various services was stressed by Mr. Messer, as well as the fact that out of 500,000 beds only 150,000 are in voluntary institutions. There should be no rivalry between municipal and voluntary hospitals, and there should be beds for all who are sick. Sir Francis Fremantle strongly endorsed Mr. Messer's plea and said that voluntary and municipal hospitals should be "cemented together," and that he would be very glad if municipal hospitals were teaching hospitals. But we must not have "a cut-and-dried" system laid down for the whole country.

The debate strayed several times towards the wider fields of general health services and Mr. Ernest Brown intervened at one point to say that he understood a whole day was to be devoted later on to these bigger issues. In winding up he returned to this point when he deferred his answer to some of the general questions—one was that of factory medical services—to that later debate. Mr. Brown said he could not now make an immediate decision on hospitals of, say, what was to be "the shape of things to come," but he could point out what was being done to get the results. It will be remembered that the Minister of Health made a statement on the hospital policy of the government last autumn. What we had to work for now was "a true partnership between local authority and voluntary hospital." The EMS scheme would not be destroyed in the post-war world. It had many lessons for the future. Regionalism on the pattern of civil-defence regions the Minister put on one side, but

"it will be necessary to design a hospital service in areas substantially larger than those of individual local authorities." Neither Mr. Brown nor any of the speakers in the debate drew attention to the singularly patchy nature of our hospital accommodation: thick around London and Birmingham, for example, tenuous in Devon and Cornwall and many other county areas.

The Ministry of Health has now under weigh a small network of surveys of parts of the problem of hospital reorganisation. Those in London are being surveyed, those in Lancashire, Cheshire and North Wales are to be surveyed. And in addition such problems as the organisation of the teaching hospital are being attacked. Mr. Brown concluded by saying that he did not wish to make "categorical decisions" in advance of the assembly of the evidence "and the debate showed the need for careful regionalisation of the surveys and for the amassing of detailed information. For the work of the medical man is harder than that of the statesman, the soldier, or the lawyer, said Mr. Brown, since he has "to pit his intelligence against nature, and nature can be a very stern judge."

FROM THE PRESS GALLERY

Future of Hospital Services

IN the House of Commons on April 21, Mr. HECTOR MCNEIL, the young Labour member for Greenock, spoke on the future of hospital administration. He moved an amendment to the civil estimates emphasising the need for regional planning of our hospital services, and expressing the opinion that the utmost efficiency with maintenance of democratic control can only be secured by full recognition of the status and responsibilities of local authorities, and that, especially in areas already amply served, independent schemes for the future building of hospitals should be discouraged as being inimical to a coördinated post-war plan. After the war, he went on, we had the right to expect a better hospital service, for with a falling birth-rate no immediate extension would be called for. Our present system had been largely determined by the pace of the horsed ambulance, but with the air ambulance geographic limitations disappeared and it would be easier to plan on a progressive scale. The Services would provide a reservoir of young professional men with administrative experience, but, Mr. McNeil was glad to say, almost penniless, for he hoped this combination of circumstances would force the state to sweep away the pernicious system of buying practices. The Services would also provide nurses if we could afford to offer them attractive conditions. Because nursing was a vocational profession that was no excuse for imposing on its members arduous and tedious duties under a discipline which children would not tolerate. But Mr. McNeil found the main reason for his hopes in the development of the Emergency Medical Service. Over 80% of all the hospitals in England and Wales were now inside the scheme and there had been a steady extension of the classes of patients eligible for admission. Mr. McNeil hoped that the remaining artificial divisions between different categories of patients would in time be swept away and the EMS put at the disposal of the whole community. Within the EMS the old conception of a general hospital had given way to a pattern of specialist hospitals, and Parliament must take care that at the end of the war the buildings and equipment of this service were not dissipated.

THREE SOPS ... AND A GAUNTLET

Before stirring up possible disagreements Mr. McNeil offered the House three assumptions which he thought they would readily accept. Good health can be bought and costs less than ill health, but we must be prepared to pay a higher price for it than we have done hitherto. On the curative side of medicine no single factor was more important than the hospital service, yet at present ours was inadequate. Today, for instance, we had not enough beds to cope with the increase in tuberculosis or cerebro-spinal fever. The weapon to tackle these deficiencies was regionalisation. But apart from these three points he feared there would be much disagreement. What, he asked, was to be the size of the region, how would it be administered, how should it be financed, and what would be the pattern of the scheme? Apart from the LCC, he felt there was no local authority suitable for this type of administration, so local authorities—like other less vocal organisations—must be made to coöperate. He suggested that the Minister should remember that the EMS unit had proved its worth. The unit had been designed to meet bombing, but disease like bombs tended to hit the country heaviest where the population is most dense. Later with the reallocation of industry and population they could be reconsidered, but for the present existing boundaries would probably be acceptable, provided there was devolution in administration. In the peace-time design of the scheme the administrative officer should be the public-health officer, for under exemplary conditions hospital service is a handmaiden to public health service. The supreme point of disagreement was the function of voluntary hospitals within any regional scheme, and for his part Mr. McNeil boldly asserted that there could be no autonomy for them if the utmost efficiency in the area was to be secured. The large voluntary hospitals were not typical, and many small-town ones carried on a desperate struggle against severe limitations, not always with very happy results. The city voluntary hospitals were the stars of the hospital world. The Cinderellas were the public-assistance and local-authority hospitals which carried on the tedious drudgery of caring for the aged and the infirm, the chronic sick and the casualties of our industrial battlefield to whom the voluntary hospitals could not open their doors. [Mr. MESSER interjected "would not," but Mr. MCNEIL persisted.] The voluntary hospitals had performed a great service when there was no other institution to do the work, but he did not think that was necessarily any longer true, and the long waiting-list was a grave drawback to the system. He hoped that the Minister of Health would remove the impression which he had created in various parts of the country that he intended to treat the voluntary hospitals preferentially.

With adequate health centres, an efficient educational health scheme and industrial medical officers Mr. McNeil believed we could ensure that disease would be quickly detected in all sections of the community. Even in normal times he expected there would be an increase in casualties as the industrial pace quickened and rehabilitation hospitals should be fitted into the pattern of the areas. He thought that an area committee would not function with maximum efficiency merely with advisory powers. It must be an executive body, composed mainly of local government members, but on which all other medical interests of the area would be represented. The Government had said they meant to maintain the principle that the patient paid according to his ability. Most people expected that National Health Insurance would be extended to cover wives and dependants. Mr. McNeil hoped it would be stretched a little farther to include a statutory contribution for hospital service, for the working man was willing to pay for a service which was necessary to his family. People are eager to know what instalment of social justice they may look for at the end of the war, and Mr. McNeil invited the Minister by defining his intentions for the hospitals to give them heart for the long tedious jobs they must undertake today.

MEMBERS AND MINISTER REPLY

Mr. D. FRANKEL who seconded the amendment was anxious that the Minister should take powers to prevent new hospitals being built without his sanction. The chairman of Charing Cross, at a luncheon at which Mr. Brown was present, had already announced the purchase of a new site in St. Giles High Street, W.C.2, in close proximity to at least four other large teaching hospitals. This did not seem to be in accordance with regional planning.—Mr. S. STOREY affirmed that whatever our ultimate hospital service may be it should be built up from existing organisations. Through the EMS and the Nuffield Trust our two hospital systems were learning to know each other. He pointed out that what had already been done in the way of coördination had been achieved by advisory and not by executive bodies. He thought the best results would be obtained by bodies with only such executive powers as their constituent members unanimously granted them. But he would give the Minister an overriding authority to take action if need be.—Mr. F. MESSER thought the

trouble was not that we had two hospital systems but that we did not have one at all. We had two types of hospital, but the voluntary hospitals were separate units and out of 66 county councils only 25 had appropriated their public-assistance institutions. He urged that we should aim at a national standard in our health services. We provided a school place for every child and we should be able to provide a hospital bed for every potential patient.—In considering finance Sir FRANCIS FREMANTLE thought the University Grants Committee would serve as a valuable precedent. A similar body should be given responsibility for the distribution of the money provided by the Government for a hospital system.—Mr. C. G. AMMON felt that something might be done to give direction rather than rebuff to philanthropy.

Mr. GRAHAM WHITE found the debate unreal, for he thought it impossible to consider hospitals apart from the general subject of medical services, but Mr. E. BROWN began his reply by explaining that later a full day was to be given to the health of the nation. He thanked Mr. McNeil warmly for his speech but said he would not attempt to define the size of a region until facts had been assembled. Surveys were at present being made, and he took no responsibility for the announcement of Charing Cross Hospital's new site. He admitted that more beds were needed for the treatment of tuberculous patients but said the real difficulty was not so much beds as nursing and domestic staff. A number of machines for mass radiology had been ordered from America and specifications had been drawn up for the manufacture of others in this country. He promised that the EMS would not be destroyed in the post-war world but fitted into the general scheme. Indeed we had much to learn from it—the grouping of special treatment centres with facilities for inter-hospital transfer of patients, country branches and auxiliary hospitals for the convalescent, and inexpensive hospital construction. Before the war it was reckoned that a hospital cost £1000 a bed. In a war-time single-storey hospital the figure was about £250. We might hope to have a sound and reasonable long-term type of construction somewhere between the two. In his statement of Government policy last autumn Mr. Brown had avoided the use of the word region—which seemed to carry unfortunate local-government and civil-defence associations—but he agreed with Mr. McNeil that a corporate hospital service must be designed in areas substantially larger than those of individual local authorities. He would aim to avoid overlapping by arranging for a proper division of functions between the hospitals in the areas. It would be uneconomic to try to provide hospital treatment town by town or even county by county. The Government also agreed with the amendment in wishing to recognise the status and responsibilities of local authorities. They intended to impose on the larger councils the duty of securing the provision of a complete hospital service. In discharging this duty the councils would no doubt look for help to the voluntary hospitals. The Government envisaged the continuance of a more ordered and regular partnership between the voluntary and municipal hospitals. A committee had been appointed to tackle Scottish problems, a survey was being made of the hospitals of London, and at the request of influential bodies representing municipal and voluntary hospitals in Lancashire, Cheshire and North Wales he proposed to institute a survey covering the territory centred on the teaching hospitals of Liverpool and Manchester. Another committee had been set up to consider the general organisation of all teaching hospitals. With so much in train Mr. Brown felt it was wise not to make categorical decisions in advance of the assembly of evidence.

Money to Burn

In the debate on the new tobacco tax in the report stage of the budget resolutions on April 22 appeals were made to the Chancellor for leniency, but Sir FRANCIS FREMANTLE suggested that if the additional tax was supposed to reduce consumption it should rather be extended to men and women in the Services. Sir Maurice Cassidy had written to the *Times* affirming that serious injury was being caused by excessive smoking in the Services, and another distinguished physician had told Sir Francis that he agreed that serious gastric troubles were the direct result of heavy cigarette-smoking among the Forces. But the proposal found little response. Mr. J. RITSON, who was appealing on behalf of old-age pensioners, assured Sir Francis that they were as immune from the attacks of tobacco as the pipes they smoked, and Lieut.-Colonel A. V. G. DOWER declared that with all due respect to medical opinion the benefit derived from a reduction of smoking in the Forces would not make up for the unhappiness it would cause. The men were separated from their homes and families; to limit their tobacco as well, in his opinion, was carrying austerity too far. If we wanted to save tobacco, why not begin with cigarette ends? Mr. DAVID ADAMS pointed out that those who indulge in heavy smoking and suffer in consequence seem to think it was worth while. Sir KINGSLEY WOOD with sympathy but firmness refused any further concessions, and when pressed by Sir Francis for his reactions to the medical side of the question replied: "I always hesitate to make an observation on medical opinion. I was minister of health for a good many years, and I was sometimes bewildered by the advice and opinions I received from medical authorities."

QUESTION TIME

The Birth-rate

Mr. IVOR THOMAS asked the Minister of Health whether it was the intention of the Government to encourage an increase in the birth-rate at the present time.—Mr. E. BROWN replied: It has been the policy of successive governments, in fields much wider than that of my department, to influence the national life and economy in favour of families with children. The income-tax allowances for children, the arrangements for the care of mothers and young children, the provision of free education and of school meals and school medical services, and the preference given to large families in the selection of tenants of municipal houses afford familiar examples. This policy has been extended by many war measures such as increased allowances for children under the Unemployment Insurance and Assistance Schemes and for children of members of the Forces, Exchequer subventions towards the cost of bread and other staple foods, the extension of the school meals service and the provision on an increasing scale of cheap or free milk and other protective foods for expectant mothers and young children. Moreover, children's clothing has been excluded from the scope of the Purchase Tax. These measures carry with them a very substantial relief from the financial burden of parentage.

Population Statistics

Petty-Officer ALAN HERBERT asked the Minister what information had been obtained from the inquiries made under the Regulations (Statistics) Act, 1938.—Mr. BROWN replied: Part II of the Registrar General's Statistical Review for 1938, which contains a report on the material obtained in 1938 under the Population Statistics Act of that year is with the printer and should be available by the end of the present week. With a view however to economy in the consumption of paper it has been decided to limit the issue in the first instance to a small number of copies which will be held by the Registrar General and made available for consultation and study by Government departments and other bodies or persons having an acknowledged interest in its contents.

Doctors for Pension Appeal Tribunals

Sir IAN FRASER asked the Minister of Pensions whether he had asked the Ministry of Health for doctors for pension appeal tribunals; and, if so, what was their answer.—Sir W. WOMERSLEY replied: I have been informed that the necessary number of doctors could not be supplied at the present time.

Sir I. FRASER: Has Sir W. Womersley represented to the Ministry that there may be a considerable number of older doctors who served in the last war, and who could undertake this work?—Sir W. WOMERSLEY: A thorough investigation into the medical personnel available in the country was made by a special committee who reported that the medical men were not available.

Mr. S. S. SILVERMAN: Does the Minister consider it really necessary to have a doctor on such an appeal tribunal? Would it not be sufficient to have any mind trained in the weighing of evidence to consider the medical evidence already existing?—Sir W. WOMERSLEY: It is not just a question of having a medical man on the tribunal. He has to assist both

the ministry and the appellant.—Sir A. KNOX: How many doctors are required?—Sir W. WOMERSLEY: I could not say without notice.

Shortening Medical Training

Sir E. GRAHAM-LITTLE asked the Minister of Health whether he was aware that certain officers on the Central Medical War Committee are exercising pressure upon the medical licensing bodies to shorten the period of training of medical students in their final years, in one instance by a sixth, owing to the scarcity of medical officers in the fighting Services, and that such measures injure the reputation of licensing bodies; whether any of the proposals for redistribution of medical man-power, detailed in the circular no. 2624, have been operated; and what are the prospects of so redistributing personnel as to meet the immediate demands both of the Services and of the civilian population without curtailing medical training?—Mr. BROWN: I am not aware of any pressure of this kind having been exercised by officers of the CMWC on medical and licensing bodies. Since circular no. 2624 was issued on April 9 it is obvious that sufficient time has not elapsed for the measures recommended to have been fully brought into operation. I am informed by the Medical Personnel (Priority) Committee that in their view both redistribution of medical personnel and some curtailment of the period of medical training are necessary.

Additional NHI Benefits

Mr. C. T. CULVERWELL asked the Minister of Health if, in view of the fact that some approved societies had no surplus funds available to provide additional benefits, such as ophthalmic or dental treatment, he would issue instructions that prospective members should be informed of the extent of the benefits which the society was in a position to provide.—Mr. BROWN replied: I have no power to require an approved society to inform a prospective member of the additional benefits, if any, which it is for the time being able to provide. A person cannot become entitled to such benefits until he has been a member of his society for the minimum periods laid down in the regulations and in the meantime a quinquennial valuation of the society's funds may have led to a material enlargement or contraction of the additional benefit rights conferred on its members. Information as to a society's current scheme of additional benefits or as to its present inability to provide such benefits may, therefore, prove misleading as a guide to probable future rights.—Mr. K. LINDSAY: Does my right hon. friend realise that this means that boys of 14–18 cannot get any dental benefit to supplement the regular attention to their teeth in school for the previous three or four years?—Mr. BROWN: This is a matter of the act and the regulations under the act.

Soldier's Death in Hospital

Mr. F. MARSHALL asked the Secretary of State for War if he would cause a thorough investigation to be made into the circumstances surrounding the death of the late Private H. Matchett, which took place at Pinder Fields Emergency Hospital on Oct. 3, 1941, six months and eight days after an operation for hernia carried out under a spinal anæsthetic; and why it was necessary to issue two death certificates, one stating that the cause of death was pyelonephritis, myelitis and toxæmia, due to bedsores, and the other, after a coroner's inquest, giving the cause of death as disease of the spinal cord and paraplegia, and stating that these conditions were due to 'Percaine' anæsthetic given for operation of left inguinal hernia.—Mr. BROWN replied: This case has already been fully investigated through a coroner's inquest. I have obtained reports of the facts and I am advised that further investigation would not be warranted. There were two death certificates because one was issued by the hospital, before the coroner directed the inquest, and the second was issued later to register the cause of death determined at the inquest. The two certificates are not inconsistent.

Approved Schools and Remand Homes

Mr. HERBERT MORRISON, Home Secretary, informed Mr. EDMUND HARVEY that at the end of March about 1100 boys and girls were awaiting vacancies in approved schools; but he hoped that before long this waiting-list would be reduced to more normal proportions, when the 16 new schools now in progress were completed. Requisitioning powers would be exercised if necessary. New accommodation for remand homes was to be provided at 20 places, and this, with the improvement in approved school accommodation, would bring about a more satisfactory position.

Letters to the Editor

HOME GUARD CASUALTIES

SIR,—Criticism of high authorities is wisely restricted in times of national emergency, but it remains true that adequate publicity is still a most powerful and useful weapon in our armoury. Someone (usually the editor) has to choose between merely destructive and spiteful criticism and essential commentary for which official channels provide no outlet. I am hoping that you may esteem this letter to fall into the latter class. It deals with the medical service of the Home Guard which has recently passed into a state of indecision which may prove most disastrous in case of invasion.

The organisation of this service is governed by various official instructions and letters which are technically of a secret character, but they included the following words which can hardly prejudice our success however widely they are known: "Since the Home Guard has no wheeled transport, its responsibility for moving Home Guard casualties must normally end at a point beyond which they can no longer be conveyed in hand-borne stretchers." This instruction has now been cancelled and we find a much heavier responsibility laid on us—"Home Guard casualties will normally be evacuated from Home Guard casualty collecting posts by ambulance transport of the Civil Defence casualty organisation. Where this cannot be made available, local Home Guard arrangements must be made." That these "arrangements" are to include evacuation beyond casualty collecting posts is further emphasised by the declared duty of Home Guard medical officers to "make arrangements for the evacuation of casualties," and by the further statement that the responsibility of the Civil Defence services does not begin until Home Guard casualties "have reached" those services.

To put the matter shortly, our old obligation to collect our casualties at collecting points, and to retain them there until the civil services could clear them, is replaced by an obligation to make arrangements for evacuating them from such posts to (presumably) the nearest posts of the Civil Defence services, which may be several miles distant. And we are to do this although we still have no transport available for the purpose. We are not told how we are to effect this evacuation although certain vague suggestions have been made of the use of hand-carts, farm wagons and the like. Nor is it clear whether civilian casualties which happen to be brought to Home Guard posts are also to share the perils of improvised evacuation.

That we should arrange to retain our casualties in as much comfort as we can until ambulances can come for them is reasonable, and within our powers. This new order to arrange for their evacuation is surely an undesirable and almost impossible alternative. Perhaps publicity may procure that clarification of the situation which is not available from official sources.

HEREWARD.

ECONOMY IN QUININE

SIR,—In reply to a question in the House of Commons (see *Lancet* April 4, p. 431) Sir Andrew Duncan stated that supplies of quinine are adequate for a considerable period. Nevertheless it is important that its use should be restricted as far as possible. After using quinine in malaria therapy now for nearly twenty years we are prompted to give some advice as a result of our experience. It is not generally recognised that the amount of quinine necessary to cure an attack of malaria varies according to the species of parasite involved; hence the importance of first establishing a diagnosis.

In *P. vivax* infections a single dose of quinine gr. 5 will abort an attack and gr. 5 once a day for 15 days will effect a cure: Larger daily doses, even if extended over a longer period, do not prevent relapses, and this applies whether the patient has been infected by the bite of one mosquito on one occasion or by 100 infected mosquitoes daily for a week. So much for primary infections; in relapses an even smaller daily dose for a few days is sufficient. This is our experience with more than six strains of *P. vivax*.

Infections of *P. falciparum* require a larger dose; we have found gr. 10 daily for ten days sufficient. Long delayed relapses or latency are not seen in malignant tertian malaria.

The problem of mixed infections is rather different, but in our experience gr. 10 daily for ten days is adequate. The so-called anti-relapse treatment is useless. To give a patient quinine gr. 10, 20 or even 30 once a week in the hope it will prevent a relapse in the future does nothing but make the patient uncomfortable.

These remarks apply only to persons returning to this country after having suffered from malaria in an area where it is endemic. In order to conserve quinine it should not be given until a relapse occurs and then not only when the diagnosis has been confirmed by blood examination. A patient returning to this country may never relapse, and even if he does, in the case of *P. vivax*, it may not be for six months or a year after his last attack.

Blood films (preferably unstained) for malaria parasites can be examined free of charge if sent to this laboratory.

Malaria Laboratory (Ministry of Health) Horton Emergency Hospital, Epsom. W. D. NICOL, P. G. SHUTE.

ACCURATE BLOOD-GROUPING

SIR,—In your annotation of April 25 (p. 509) the description of the methods used in this unit for the diagnosis of the ABO system of groups contains two mistakes which we think are important enough to need correction. The first is the statement (in line 36) that, after capping, tubes are "kept in the cold for 2 hours"; actually our description was "left undisturbed on the bench at room temperature for two hours, after which readings are made." The second (sixth line from bottom) is just a verbal slip: "antibody α" should read "antibody α_1."

Galton Laboratory Serum Unit, Cambridge. G. L. TAYLOR, R. R. RACE.

CASE HISTORY IN DIAGNOSIS

SIR,—Schweninger told this story about his first meeting with Bismarck. Bismarck received him with the words "I don't wish to be interrogated; with your high reputation you must find out my disease by yourself." "Agreed Excellency," replied Schweninger, "then I will place myself in charge of you as a veterinary physician." That Bismarck was not offended by this remark was shown by the fact that Schweninger remained his physician until he died. Nothing was further from my mind than to depreciate veterinary medicine; I was for many years Zuntz's assistant at the Tierphysiologisches Institut.

London, W.1. J. PLESCH.

BLOOD IN THE STOOLS

SIR,—I venture to anticipate that many will share my surprise at the discovery of L. Schiff and his colleagues that a tarry stool can result from so comparatively small a volume of blood as 100 c.cm. introduced into the alimentary canal. I have had no opportunity as yet of reading their original article and am quoting from your annotation of April 18 (p. 482). At a guess I should have expected a minimum of at least three times this volume and it is a consolation to receive reassurance that a tarry stool does not necessarily indicate a large hæmorrhage. I can confirm the further observation that blood or rather its products of digestion can persist for fourteen days, as represented by a positive occult-blood reaction, after the ingestion of a single large dose which would correspond to a single substantial hæmorrhage; a circumstance which has the inconvenience of leaving uncertainty whether hæmorrhage may not be continuing. I have, in fact, importuned my physiologist and pathologist friends to devise some method or test which would differentiate fresh blood from its decomposition products; but this, apparently, is asking too much and decision must be based on clinical and other laboratory considerations.

Another practical point which may be worthy of attention is this. What is the minimum quantity of blood which would subsequently produce a positive reaction for occult blood in the stools? I was stimulated to an elementary research 28 years ago through the assertion of a leading pathologist of the day that the faintest trace would yield an unmistakable benzidine reaction so that not only must every trace of hæmoglobin containing food be withheld, but the greatest care exercised in brushing the teeth since hæmorrhage from the tinest abrasion would be sufficient to invalidate the test. For several weeks I lived on a hæmoglobin-free diet ingesting measured quantities of my own blood until a positive reaction could be recognised, and I came to the conclusion that at least 15 minims or practically a full cubic centimetre was the minimum. If my investigations were reliable they suggested that extreme precautions however commendable scientifically were not in practice necessary. I had hoped to have extended the investigation to determine whether ingestion of frequently repeated smaller quantities, (say) half a minim hourly, led to a positive result with greater certainty than the larger volume taken at one dose; but apart from the inconvenience of subsisting indefinitely on a hæmoglobin-free diet, the intervention of the war ended my opportunities. The same idea must surely have occurred to others who may have worked on a scale which would dispose of any doubts introduced by my little personal research and made it possible to dogmatise where to draw the line between strictly scientific and conveniently clinical tests.

Brook Street, W.1. ADOLPHE ABRAHAMS.

DOUBTS ON VITAMIN K FOR THE NEWBORN

SIR,—Your annotation of April 18 (p. 481) is so misleading that we feel it gives a false impression not only of the findings of Sanford and others (*J. Amer. med. Ass.* Feb. 28, 1942, p. 697) but also of the present status of hæmorrhagic disease in the newborn. After discussing the "physiological" prothrombin levels in the newborn on the basis of data which agree qualitatively with those of all other investigators, Sanford and his colleagues draw attention to the occurrence of a number of minor "hæmorrhagic manifestations"—bruises, asphyxial hæmorrhages and transient melæna or hæmatemesis—which may occur in the presence of a normal prothrombin index. On this basis, and on the finding of a uniformly normal clotting time, Sanford concludes, quite legitimately, and moreover reiterates categorically, that these are not manifestations of hæmorrhagic disease of the newborn. Yet in your annotation you reprint his table and summarise it in the words "these surprising results." Moreover, you do not mention that all the infants with these "hæmorrhagic manifestations" reported by the American authors recovered without any treatment—a clear indication of their triviality and insignificance. The surprising thing is that these conditions should ever have been included in the category of hæmorrhagic disease—as "palpably absurd" an inclusion as to consider all external or subcutaneous bleeding in the jaundiced patient as evidence of prothrombin deficiency.

The characteristic of hæmorrhagic disease in the newborn is gross deficiency of the plasma prothrombin, hence the term pathological hypoprothrombinæmia of the newborn previously applied to the condition by one of us. In addition, the clotting time is prolonged, and bleeding may occur superficially or internally and is persistent. Under these circumstances no disappointment will await the prudent clinician who gives vitamin K. He will relegate to their proper station such minor accidents as have been made so much of in your annotation under the caption "hæmorrhagic manifestations" and will continue to look out for and successfully to treat, with vitamin K or its analogues, the serious bleeding which results from severe prothrombin deficiency in the newborn.

Simpson Maternity Pavilion, Royal Infirmary, Edinburgh. A. I. S. MACPHERSON, J. L. HENDERSON.

MIGRAINE

SIR,—Dr. Leyton's train of thought about the ætiology of migraine prompts me to bring forward my own approach and the measure of success I have obtained. An article by Dr. J. Freeman suggested to me its possible allergic nature and I therefore tried non-specific desensitisation using peptone (Armour), first dose 0·25 c.cm. increasing 0·25 c.cm. per dose at 5-day intervals to a maximum of 2·0 c.cm. In the event of an attack or reaction, either urticaria or headache, the last dose was repeated 5 days after the reaction had subsided. Here are brief notes of two cases.

1. Female, aged 40; hysterectomy 12 years before; having severe attacks twice weekly with intermediate heaviness of head amounting almost to headache. Stilbœstrol and 'Antuitrin-S' tried with no result. First course of peptone 15 months ago. After 4 doses, attacks less frequent and severe, and intermediate headache vanished. Second course 6

months ago 1 c.cm. to 2 c.cm. Only one attack in last 10 weeks.

2. Female with occasional severe attacks and intermediate headaches. After 5 doses, headaches vanished, replaced by a general feeling of well-being. Attacks now only once in 3 months.

From these results I conclude that there is a definite allergic factor in some cases of migraine, especially as in both cases attacks were worse after the eating of meat. I intend to try Dr. Leyton's method in my next case.

Llandudno. BENJAMIN MUSHIN.

VITAMINS IN OPHTHALMOLOGY

SIR,—In your annotation of April 11 you state that in tobacco amblyopia I have incriminated lack of vitamin B_1. No such statement was made by me. In the paper concerned (*Brit. J. Ophthal.* 1941, **25**, 556) I described a case of retrobulbar neuritis and peripheral neuritis in a chronic alcoholic and pipe smoker. His diet was greatly deficient in vitamin B_1 and he had complete achlorhydria. Although he continued to smoke he improved rapidly by giving him a mixed diet, 'Bemax' and vitamin B_1 intramuscularly and stopping his alcohol. I also reviewed the literature showing the association of retrobulbar neuritis with beri-beri, pellagra, chronic alcoholism, pregnancy and diabetes mellitus. An analogy to peripheral neuritis was thus noted which is now generally recognised to be due to vitamin-B_1 deficiency in the aforementioned conditions. Its association with pellagra suggests a mixed deficiency of B_1 as well as of nicotinic acid. I concluded that all cases of bilateral retrobulbar neuritis should be investigated as to the vitamin-B content in the diet, particularly if associated with beri-beri, pellagra or peripheral neuritis, and treated accordingly.

There appears to be no doubt that tobacco does cause retrobulbar neuritis, but in some of these cases it is possible that nutritional deficiency—i.e., hypovitaminosis B_1—is an added factor and this would have to be corrected. I certainly believe that tobacco alone as a toxic factor is able to produce this lesion. The pathological lesion in tobacco amblyopia is indistinguishable from that found in hypovitaminosis B_1, and it would thus be preferable to use the term retrobulbar neuritis and determine the causal agent, whether tobacco, nutritional deficiency, sphenoidal sinusitis, disseminated sclerosis, &c.

In beri-beri—cranial nerve lesions, especially of the 6th and 8th nerves, have been described as well as optic nerve degeneration. In these days when nutritional deficiency may become possible it would be well to bear in mind that loss of vision is one of its symptoms.

Highgate Hospital. B. GOTTLIEB.

STUDENTS' CALL-UP

SIR,—It seems a little unfair that the de-reservation of unsuccessful examinees should be at the discretion of the individual deans of the medical schools. There is almost certainly a wide diversity of opinion amongst the deans on this question. Would it not be possible and fairer to form a committee of responsible persons before which the delinquents could appear and be given a chance to explain their failures?

Another point is the difference between the various exams. The London finals take 3 years to complete, Cambridge 2¼ years, and the Conjoint only 2¼ years. The last is held every three months, whereas the first two are held only twice yearly. Some students, in an endeavour to serve their country, are making the conjoint their primary aim, in order to qualify as soon as possible; others hold back, either not taking the conjoint at all or not completing it until they have had a chance to take their university degree. At the moment this applies more especially to the London students, but with the reduction in the conjoint qualifying time to 2¼ years will apply to all. What action is to be taken against students failing in conjoint exams who fail because they sit at the earliest possible moment? And what action is to be taken against those who deliberately delay qualifying by conjoint in order to sit for their university degree? Are the former to be penalised and the latter to be commended? And remember that failure in the conjoint means only a three months' delay whereas failure in a university degree means a further six months before qualifying. The remedy seems to be in either making all students take the conjoint exams (an expense, no doubt) or in allowing those who do qualify early by conjoint the time to complete their university degree.

At present newly qualified men are allowed a six months' house-job before being called up. Would it not be possible for this house-job to consist of three months as an HP and three as an HS? And is it not time that steps were taken to stop the pernicious system whereby those who can grab a B1 or B2 job are allowed further time before being called up? Such a system does not induce young men to join the forces when their less patriotic brethren remain behind in comfortable and interesting jobs and have the chance of studying for higher degrees. Under the present system I shall probably do my utmost also to grab a B job.

London. REX FENDALL.

ANTISEPTIC EMULSIONS

SIR,—We thank Mr. Coutts for his letter of April 11. Two typographical errors in our paper of March 21 have been overlooked—the first and the last of the formulæ for emulsions (p. 349) are O/W emulsions and not W/O emulsions since Lanette Wax SX is the emulsifying agent present. Emulsions with cera alba as the emulgent (W/O) were too stable for our requirements, those with lanette wax SX (O/W) were varied with the several amounts of oil, water and wax used. Our original basic emulsions of required *instability* was of the W/O type using cera alba as the emulgent and lanette wax SX as the antagonist. Our early cases described in the paper were treated with this type of emulsion, later cases were treated with the simpler lanette wax SX (O/W) preparation described as our standard now. Little difference was noted clinically; the W/O type emulsion cere alba-lanette wax SX has been discontinued in favour of the simpler O/W lanette wax SX standard mentioned.

R. M. HEGGIE, C. G. BRADBURY,
Aberdeen. J. F. HEGGIE,

SEX AND TABOO

SIR,—I am evidently the schoolmaster mentioned by your peripatetic correspondent (*Lancet*, April 11, p. 456) and some account of my experience with young people may be of interest. When I began teaching, some fifteen years ago, I did not believe there was any sex problem among schoolboys, or I thought that if there was such a problem it was neither grave nor urgent enough to call for any special help from a teacher. Since then I have gone about with boys; I have listened to their more or less familiar conversation; I have seen the sort of books they read if they get half a chance; and I have noted their reactions to the naked human body and to pictures of it. My practice is now to answer questions when I am asked. Boys will ask questions, sometimes indirectly, if they know they will get an answer and if they are sure they are not being laughed at. If I can, I answer the question on the spot, but more often it is necessary to explain that such a matter cannot be dealt with in a sentence. In such cases I ask the questioners to come to see me by my own fireside, and they generally do so in twos and threes. It is not possible to consult parents. Boys would have nothing to do with it at all if they thought their parents were going to be brought into it. "I simply can't talk to my father about it," said one, and I believe that to be the almost universal experience. When they have said, often with difficulty, what it is they want to know, I explain about taboo. Without this, the rest means nothing. There are examples in "The Golden Bough" and in Freud's "Totem and Taboo" of people who cannot say aloud the tabooed names of their dead or eat tabooed food. My listeners generally find this interesting. I go on to say that we have a taboo on sex and that we are all affected by it (including, obviously, myself) and suggest that for the next hour or so there shall be no taboo. Then I answer their question. Whatever it is, it always leads to an account of the processes of human reproduction. It is necessary to give this account very plainly, and even crudely, in the words—mostly tabooed—which they know. The taboo is broken. Words are recognised for what they are—labels attached to things or actions which remain the same whatever they are called. After

this point, questions are nearly always asked freely, many of them being small physiological inquiries which can be answered fully and exactly in a few moments. Other questions are of the greatest social and moral importance. Boys vary enormously in the extent and accuracy of their knowledge, but they are all deeply interested. They listen attentively to such suggestive guesses as the theory of recapitulation. Aldous Huxley's "Fifth Philosopher's Song" (quoted in "The Week End Book") and Laurence Housman's speculations on "What is indecency?" strike them as pertinent comments. Many of them have given the matter a good deal of thought. "I'm quite sure that if people only understood it as you've explained it, about taboo, they'd behave in a different way," said one, speaking, I think, for many.

Of course, "sex-instruction" cannot create intelligence where it does not exist. It can only release intelligence from fear. Boys who have seen through taboo are able to think and talk clearly on sexual matters—to say what they mean and have done with it. Further, having realised how potent and how fraudulent word magic can be they are less ready to accept "witch-words" in other departments of knowledge. They begin to be free men. They get, perhaps, an inkling of what is meant by intellectual integrity and moral courage and it should help them to face the perplexities of the future with clearer heads and stouter hearts.

Chester. R. W. FAINT.

INFECTIOUS DISEASE IN ENGLAND AND WALES

WEEK ENDED APRIL 18

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1027; whooping-cough, 1555; diphtheria, 786; paratyphoid, 8; typhoid, 11; measles (excluding rubella), 4087; pneumonia (primary or influenzal), 1089; puerperal pyrexia, 162; cerebrospinal fever, 158; poliomyelitis, 3; encephalitis lethargica, 5; polio-encephalitis, 1; dysentery, 208; ophthalmia neonatorum, 108. No case of cholera, plague or typhus fever was notified during the week.

Deaths.—In 126 great towns there were 1 (0) deaths from an enteric fever, 2 (0) from scarlet fever, 3 (1) from measles, 16 (3) from whooping-cough, 16 (0) from diphtheria, 44 (7) from diarrhœa and enteritis under 2 years, and 36 (4) from influenza. The figures in parentheses are those for London itself.

Oxford reported the fatal case of enteric fever, Birmingham had 5 deaths from diarrhœa and 3 from influenza.

The number of stillbirths notified during the week was 232 (corresponding to a rate of 36 per thousand total births), including 18 in London.

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†Dr. ROBERT LIVINGSTON LOUGHRAN, who died on Feb. 27, was from 1924–36 the efficient and devoted secretary of the American Laryngological, Rhinological and Otological Society. Born in 1873 the son of Robert Loughran, M.D., of Kingston, N.Y., he graduated A.B. from Princeton University in 1895 and four years later obtained his M.D. at the College of Physicians and Surgeons, Columbia University. His work in his specialty won recognition and he became assistant surgeon to the ear department of Manhattan Hospital, attending otologist at the New York Post-Graduate Hospital, and assistant attending otologist at the Lying-in Hospital. He joined the staff of the New York Post-Graduate Medical School as instructor and eventually became professor of otology. During the last war Loughran served as a major in the Medical Corps and for two years acted as superintendent of the Ancon Hospital and chief health officer of the Panama canal district. After his retirement from medical work in 1934 he settled in Sharon, Connecticut, where carpentry and loom-weaving claimed much of his leisure.

Messrs. H. R. NAPP Ltd. are issuing a new non-toxic sedative elixir called 'Hypnasol' which contains urethane 6·9%, sodium bromide 6·9%, hyoscyamus 0·92%, liq. malt extract 25%, with aromatic carminatives.

In the proof of the fifth addendum to the BP, reviewed on page 518 of April 25, the dose of *liquid extract of squill* was incorrect; it should be min. ½–3.

NAVAL AND MILITARY MEDICINE CHESTS

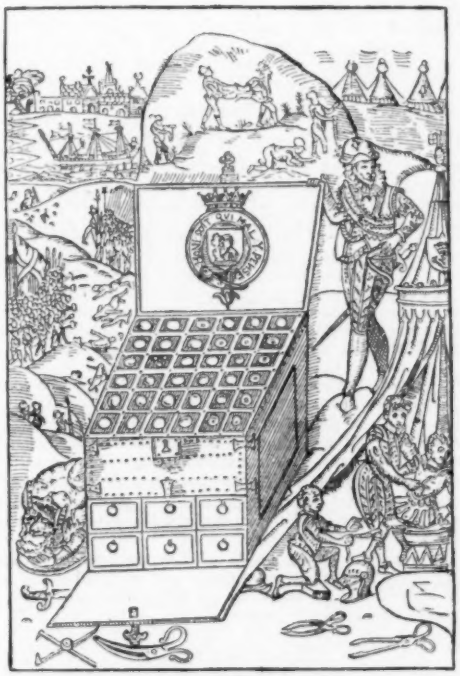
C. J. S. THOMPSON, M.B.E.

HON. CURATOR OF THE HISTORICAL COLLECTION, ROYAL COLLEGE OF SURGEONS OF ENGLAND

SOME in the Services today may care to glance back at the medical equipment with which the Navy and Army were supplied four hundred years ago. The medicine chest, as such, has a very old history; a specimen, still extant, was discovered at Thebes near the end of the last century, which had belonged to the Egyptian queen, Mentu-Hotep, in about 2200 B.C. The outer case, stoutly built of wood and evidently intended for transport by camel, bears the royal cartouche. The enclosed chest is made of closely plaited papyrus, and contains spaces for six alabaster jars. When found it held several medicinal roots, a wooden spoon, and some small instruments, probably used for toilet purposes. From the time of the Pharoahs until recent centuries little is known of the materials supplied to the surgeons who accompanied armies in the field, except that pitch and other tarry substances were chiefly used for the dressing of wounds. Celsus tells us that the Greeks and Romans applied honey or wool dipped in oil or cauterised wounds with a red-hot instrument—a treatment continued till the time of Ambroise Paré. In England, when Henry V. voyaged to France in 1415 to fight at Agincourt, Thomas Morstede his surgeon was allowed three archers for his protection and twelve assistants or "surgeons' mates." There is no record of the drugs they carried, but presumably they included the "vulneries" employed at the time. Some idea of the variety and number of these may be gathered from Fabricius the Swiss Army surgeon who recommended, in the sixteenth century, that the military chest should be furnished with 362 varieties of medicines, some of which contained 64 ingredients.

The discovery of an old naval medicine chest in a town on the Adriatic a few years ago furnished us with the names of some of the drugs and medicinal preparations usually carried, and gave a clue to the diseases which the medical officer might be called upon to treat. Judging from the heraldic devices which it bears the chest belonged to an admiral of the Venetian fleet who commanded a war galley in the Mediterranean between 1546 and 1650. Such galleys were mostly triremes propelled by upwards of a hundred convicts or slaves chained to the oars. Each ship carried fighting men; a Capuchin Friar and "two doctors with two medicine chests fitted with the necessary medicines" who embarked on each galley to look after the men. The chest discovered was made of stout chestnut-wood covered with leather; it was 27 in. long and 14 in. high, and had two bronze handles and protective metal bands. Inside the lid was a painting of the "Triumph of Hygeia." The upper compartment contained 153 bottles and vessels with parchment tops. Their labels showed them to have contained such things as: *Acqua di Scordio Vero*, made from the water germander and chiefly employed internally for fevers and plague or applied externally for wounds and ulcers; *Acqui di Carduo Santo*, distilled from *Carduus benedictus* which was given in quartan and other fevers (and which Beatrice, it will be remembered, was advised to take as a cure for gloom about Benedick); *Acqui d'animidi Persiche*, which was distilled from peach kernels and given for internal tumours, gout and ulcerated throats; *Acqui di scorzonera*, distilled from serpentary roots used for plague; and *Acqui ruta capraria* or rue water, taken as a preservative against plague, fevers and colic. There were also two small bottles to hold *Olio di centianni* or oil of scorpions—used to prevent plague and as an antidote to poisons—and *Olio di mirto* or oil of myrtle, employed as an astringent and stomachic.

Below the compartment were three drawers, the top one containing 56 bottles of varying capacity each with a pewter stopper. The second drawer contained two flat boxes with sliding lids for plasters, while in the centre was a pair of apothecary's scales with steel beam and brass pans and a small agate mortar. The third and bottom drawer contained 76 rectangular pewter boxes for holding pills, powders and ointments. There were bottles for oil of vipers used for gout, leprosy and in skin diseases, cedar bark oil for snake-bites and plague,



Military Medicine Chest
From "Young practitioners of Chirurgery," by William Clowes, 1588.

human gall-stone given to those who had gall-stones of their own, oil of amber used for plague and epilepsy, balsamo artifiato composed of aloes, galingal, myrrh, amber, turpentine and musk for dressing wounds, *Elixir vitæ*, containing 22 ingredients including ginger, orris, mint, thyme, cloves, nutmeg and cinnamon, and a powder for delirium made from antimony, sulphur and coral. In the second drawer were otoliths, called in the middle ages "Peter's stones; they were regarded as a specific for colic or alternatively could be carried as an amulet to protect the wearer from injury. In the bottom drawer were pieces of unicorn's horn, the famous antidote used against all poisons, also given for gonorrhœa; extract of guaiacum used for syphilis; *Unguento da Caroli*, employed in venereal diseases; *Unguento gratia Dei*, used for dressing wounds to prevent gangrene; *Orvietano*, a celebrated remedy for plague and smallpox to be found in the first London Pharmacopœia; treacle of Andromachus (invented by that notable physician to Nero) which contained 65 ingredients and was used for plague; and specimens of *Terra sigillata*, the famous "sealed earth of Lemnos" which was regarded as an antidote to all poisons and a remedy for plague.

On the whole it seems that plague was the disease most dreaded in warships; since they put in at many Near Eastern ports, infection might well be carried aboard by the crew; and venereal diseases were evidently also prevalent.

A striking contrast to this naval chest is to be found in the massive military chest depicted by William Clowes in his treatise addressed to "Young practitioners of Chirurgery" and printed in London in 1588. William Clowes was born in 1563, served as surgeon to the army in France, under the Earl of Warwick, and became chirurgeon to Queen Elizabeth in 1596. He was attached to St. Bartholomew's Hospital in 1591. The chest illustrated in his book is very large and contains three trays for bottles, 36 in the top tray alone while below are six drawers for other containers. A military chest, almost intact, found in a castle near Genoa and is made of pine covered with leather and bound with heavy iron clamps. It measured 26 in. by 12 in., and the lid was protected by strong iron hasps. Inside were spaces for instruments of which only a brass spoon, a horn-spoon and a spatula with double ends for measuring powders, remained. The top tray contained 30 square bottles; and the whole was lined with green cloth edged with gold tinsel braid. The bottles were of the white glass of the seventeenth century and contained sublimed sulphur, *Liquor anodin*, *Tinctura castorei*, spirit of cornu cervi, laudanum, *Myrrha croco*, *Syrupus dicodii*, Kermes mineral, *Confectio alkermes* and cinnamon water. All these were drugs typical of the period. The liquid anodyne was a spirit of ether; tincture of castor was employed as an antispasmodic and sedative, spirit of hartshorn as a stimulant, myrrh and antimony were used to arrest hæmorrhage; syrup of dicodium was syrup of poppies, kermes mineral was antimony oxysulphide and confection of alkermes, a preparation of cochineal, apples, rose water, ambergris, pearls and musk. The second tray contained a pestle and mortar of grey schist, another of brass for pounding hard substances, and a pair of apothecaries scales with brass pans, with a set of weights, a roll of white leather to use as a base for plasters from which several pieces had already been cut and shaped for fly blisters. The bottom of the chest was divided into compartments to hold bottles and canisters for gum Arabic, sal ammoniac, sugar candy, jalap root, Peruvian bark and potassium acetate; there were also a large brass pestle and mortar, a pewter measure graduated in ounces, and a funnel.

ANOTHER PAPER CONTEST

THE last waste-paper contest between local authorities was so successful that another is to be held between May 1 and July 31. This time the competitors will be divided into three divisions—borough, urban and rural councils—and a prize of £2500 is offered for each division, with another for Scotland. The munitions industry needs more and more paper, and the Salvage Board is no doubt right in thinking that households and offices can still supply it by turning out the old letters and other papers, books and journals they have stowed away.

Medical News

University of Manchester

At recent examinations the following were successful:—

THIRD M.B., CH.B. EXAMINATION

Pathology and Bacteriology.—D. J. Atherton, Margaret A. Barber, Alice I. Burke, Margaret R. Burke, William Clegg, Lionel Erin, Frank Fletcher, J. W. Fletcher, Edmund Isherwood, R. M. Laslett, Thomas Moss, Arthur Ramsden, P. H. Renton, M. M. Rose, Bernard Samuels, Pauls Vulfsons, Margaret Wardle.

Pharmacology.—Margaret A. Barber, R. B. Broughton, Samuel Epstein, G. V. Feldman, Margaret Hedley, E. V. Mellor, and Nancy B. Penney.

University of Glasgow

On April 18 the following degrees were conferred:—

M.D.—*W. F. Anderson (with honours), G. L. Brown, Ian Campbell, I. M. Davidson, Robert Gibson, and J. B. Macdonald.

*In absentia.

M.B., Ch.B.—A. S. Anderson, Thomas Anderson, William Anderson, W. L. Anderson, R. V. Bannister, Peter Beattie, Ernest Bebbington, Benjamin Bernard, R. H. Bowie, Robert Burns, R. M. Calman, M. M. Campbell, H. O. Chisholm, T. A. Cockburn, William Craw, W. M. B. Davidson, Marion Ferguson, Alexander Finlayson, Maurice Fogell, Archibald Forrest, Esther M. Forsyth, Marion H. Fraser, W. D. Fraser, T. B. Gardiner, R. S. Gibson, R. D. Glaister, J. S. T. Goldie, A. M. Greenshields, Donald Gregory, J. R. G. Grice, W. G. Harrington, A. H. D. Hunter, F. W. B. Iveson, William Jack, I. J. MacCammond, I. F. McCaw, H. M. McDonald, A. J. McKendrick, Patrick McKillop, John McKimmie, A. A. McKirdy, S. C. Macmillan, A. T. McNeil, James Macpherson, David Martin, Jane H. Merry, David Mitchell, J. E. Morton, T. M. Park, I. S. Phillips, Normana R. Plews, J. S. M. Pollock, J. S. S. Pollock, T. M. Pollock, J. M. Rosie, Maeve Rusk, J. W. Sandler, Israel Shenkin, Max Shuglett, Alexander Starritt, Thomas Stevenson, I. H. Stewart, S. D. Thomson, Elizabeth P. Wade-Evans and J. F. H. Wood.

Bellahouston Medals, for eminent merit in M.D. thesis, were awarded to the late Surgeon Lieutenant R. M. Calder, to Dr. Margaret Crawford and Dr. A. C. Lendrum.

Scottish Conjoint Board

On April 18 the following having passed the final examination of the board were admitted licentiates of the Royal Colleges of Physicians and Surgeons of Edinburgh, and the Royal Faculty of Physicians and Surgeons of Glasgow:—

Aaron Bernstein, H. B. Bieber, Lois C. Burgh, A. W. Chambers, Pasquale Cherico, H. C. Denis, George Fahmy, Elizabeth H. C. Geach, William Gibson, S. W. Grant, R. I. Greenblatt, I. V. Hankins, N. M. Jaret, S. M. Kahn, J. H. Kelly, Norman Margolis, Robert Meek, Lionel Naftalin, R. A. Ramsay, R. M. Rizkalla, Gurdeep Singh, A. U. Somerville, T. A. Spitz, Leonard Stone, K. T. Sweeney, G. N. Tyler and Philip Weyman.

Royal College of Obstetricians and Gynæcologists

At a meeting of the council held on April 25, with Prof. W. Fletcher Shaw, the president, in the chair, F. N. Reynolds (London) was admitted to the fellowship and W. J. H. M. Beattie (London) and C. M. Gwillim (London) were elected to the fellowship.

The following were admitted to the membership :—

V. H. Barnett, R.A.M.C., H. H. F. Barns, R.A.F., Mary A. Murray Bigby, London, A. B. Concanon, London, Mary D. Daley, London, M. L. Gaudin, Canada and R.A.F., L. A. Ledingham, London, K. M. MacKenzie, Sheffield, and Lillian M. N. Raftery, London.

At the annual general meeting of the college held afterwards, the following were elected to council in place of those retiring :

Representatives of the fellows :—Mr. William Gilliatt, London, Prof. A. M. Claye, Leeds, Dr. E. C. Fahmy, Edinburgh, and Mr. C. H. G. Macafee, Belfast.

Representatives of the members :—Mr. A. C. H. Bell, London, and Dr. Hector Ross MacLennan, Glasgow.

Conjoint Qualification

As a war emergency measure candidates are now admissible to the last subject of the final examination for the L.R.C.P., M.R.C.S., diplomas after thirty months of clinical study, instead of thirty-three. The emergency regulation permitting a candidate to enter for one part of the final examination after twenty-four months of clinical study is not affected.

Course on Industrial Medicine at Leeds

A week-end course on industrial medicine will be held at the Firth Institute of Pathology, University of Leeds, on May 30 and 31. The opening paper will be given by Dr. J. C. Bridge on some medical aspects of factory legislation. Other speakers will include Dr. R. E. Lane, Dr. S. A. Underwood, Dr. J. T. Ingram, Judge Frankland and Mr. John Foster, F.R.C.S. Further information may be had from the dean of the school of medicine, Leeds, 2.

Medical Casualties

In recent casualty lists the deaths are announced of Major A. C. Elliott, M.B. Dubl., R.A.M.C. and Major A. W. P. Todd, M.C., M.B. Dubl., R.A.M.C. Surgeon Commander A. N. Forsyth, M.B. Aberd., R.N., reported missing last August, is now known to have been killed on active service. Major J. W. D. Bull, M.B. Camb., D.M.R., R.A.M.C., and Lieutenant R. H. Cuthbert, M.B. Edin., R.A.M.C., have been posted as missing since the fall of Singapore.

Tuberculosis Association

A meeting will be held at 26, Portland Place, London, W.1, on Friday, May 15, at 4 30 P.M., when Dr. J. E. Stokes will read a paper on a scheme for the prevention of tuberculosis. Afterwards the discussion held at previous meetings on the rehabilitation of the tuberculous will be continued.

Royal Society of Arts

On Wednesday, May 6, at 1.45 P.M., Prof. J. C. Drummond, D.Sc., will speak on war-time nutrition and its lessons for the future. Lord Woolton will be in the chair, and the meeting will be held at the house of the society, John Street, Adelphi, London, W.C.2.

Biochemical Society

The next meeting of this society will be held at St. Mary's Hospital medical school, Paddington, W.2, on Saturday, May 9, at noon.

Association of Scientific Workers

The executive of this association has set up a provisional medical sciences committee "to further the objects of the A.Sc.W. among scientific and technical workers concerned with the medical and ancillary sciences." The first meeting will be held on Saturday, May 9, at 3 P.M., in the Small Conway Hall, Red Lion Square, London, W.C.1. Further information from Dr. J. H. Humphrey, 32, West Hill Court, Millfield Lane, N.6.

Royal Society of Medicine

The section of medicine will meet on Tuesday, May 5, at 3 P.M., to discuss the Workmen's Compensation Act as a factor for prolonging invalidism. The opening speakers will be Dr. Bernard Hart, Mr. H. E. Griffiths, and Dr. Tom Eastham, K.C. At the section of history of medicine on May 6, at 2.30 P.M., Dr. Douglas Guthrie will read a paper on Jerome Cardan, physician, astrologer and mathematician, 1501–76. The annual meeting of the section of surgery will take place at the Central Middlesex Hospital, Acton Lane, N.W.10, on May 8, at 2.30 P.M., and afterwards cases will be shown. On the same day at 3.30 P.M. the section of ophthalmology is holding a clinical meeting at the Tennent Institute, Glasgow.

Hospitals Day 1942

This year the voluntary hospitals of London are holding their hospitals day on Tuesday, May 5. Further particulars may be had from London Hospitals Street Collections Central Committee, 36, Kingsway, W.C.2.

Health and Education in Nursery Years

The Nursery School Association of Great Britain has chosen this subject for its summer schools which meet this year at Edinburgh on July 11–25 and at Oxford on Aug. 4–18. At both courses lecturers acquainted with Poland, Czechoslovakia, Russia, India, China and the Dominions will describe the care of children in the allied nations. At Edinburgh Dr. T. Y. Finlay will give four lectures on safeguarding the health of children in nursery groups, and at Oxford Dr. William Blatz, director of the institute of child study of the University of Toronto, will discuss child development and its effect on nursery-school education. Further information from the secretary of the association, Hamilton House, Mabledon Place, London, W.C.1.

Mr. Gerald Hughes, F.R.C.S., has been elected governor of the Merchant Adventurers Company of York.

Surgeon Rear-Admiral W. H. EDGAR has been appointed an hon. physician to the King, in succession to Surgeon Rear-Admiral G. F. Syms, who has retired.

At a sitting of the South-Western Conscientious Objectors Tribunal at Bristol Dr. Conrad Latto was granted exemption from military service on condition he remained in the medical profession.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

Appointments

BENTLEY, C. A., C.I.E., M.B. EDIN., D.P.H. : temp. asst. M.O. for civil defence casualty services at Coventry.

FULLERTON, JANE, M.B. BELF. : asst. school M.O. for Huddersfield.

RODGER, WILLIAM, M.B. GLASG., D.P.H. : assist. M.O.H. for Stockton-on-Tees.

STEINER, GEORGE, M.D. VIENNA : radio diagnostician at Bristol Royal Hospital.

Births, Marriages and Deaths

BIRTHS

BALFOUR.—On April 20, in London, the wife of Surgeon Lieutenant H. Melville Balfour, R.N.V.R.—a daughter.

BARBER.—On April 25, at Gerrards Cross, Bucks, the wife of Squadron-Leader H. S. Barber, M.D., R.A.F.O.—a daughter.

DODDS.—On April 18, at Bangor, Northern Ireland, the wife of Surgeon Lieutenant G. R. Dodds, R.N.V.R.—a son.

HOWELL.—On April 17, at Tonbridge, the wife of Lieutenant William Howell, R.A.M.C.—a son.

LEWIS.—On April 19, at Gatley, Cheshire, the wife of Dr. A. A. G. Lewis, of Manchester—a daughter.

MCDONAGH.—On April 25, at Edinburgh, the wife of Dr. J. O. McDonagh, of Stanley, Perthshire—a son.

MARRIAGES

GOLD—HENRY.—On April 18, in Edinburgh, James Munro Gold, surgeon lieutenant, R.N.V.R., to Louisa Margaret Henry.

MARSHALL—PALMER.—On April 24, in London, J. H. Marshall, captain, R.A.M.C., to Bridget Palmer, Q.A.I.M.N.S.

MARTYN—ROUHIER.—On April 21, in Glasgow, David Martyn, surgeon lieutenant, R.N., to Gladys Rouhier.

DEATHS

BROGDEN.—On April 23, at Hove, James England Brogden, L.R.C.P.E., lieut.-colonel, R.A.M.C., retd., formerly of Ryde.

BUCHAN.—On April 22, at Baring Road, Grove Park, London, S.E.12, Carl Joseph Barrett Buchan, M.B. GLASG.

COHEN.—On April 18, at Dane Court, Bishops Avenue, N.2, Charles Leon Cohen, medical superintendent of the Belgian Red Cross, London, and professor of pædiatrics in the University of Brussels.

HAINES.—On April 21, at Rochdale, Edward Haines, M.R.C.S., D.P.H., surgeon, R.N., retd., aged 89.

HIRSCH.—On April 23, in London, Leonard Hirsch, C.I.E., F.R.C.S.E., lieut.-colonel, I.M.S. retd., of Llandrindod Wells, aged 62.

HOSFORD.—On April 22, Arthur Holloway Hosford, M.R.C.S., of Eastbourne and Leeds.

LEGGATT.—On April 23, Gerard Stedman Leggatt, M.R.C.S., of Hove.

MCNAUGHT.—On April 25, at Penzance, James Gibson McNaught, M.D. GLASG., D.P.H., lieut.-colonel, R.A.M.C., retd.

RAWNSLEY.—On April 15, in Malta, Gerald Thomas Rawnsley, C.B., C.M.G., M.R.C.S., colonel, late R.A.M.C., retd., aged 77.

REID.—On April 27, at Crowborough, Robert Watson Reid, M.B. ABERD.

STURGE.—On April 21, at Welwyn Garden City, Henry Havelock Sturge, M.R.C.S., L.S.A.

TAIT.—On April 11, in India, Alastair Tait, M.B. ABERD., lieut.-colonel, I.M.S.

VITAMIN THERAPY

IN MENTAL AND PHYSICAL FATIGUE

It has been shown that heavy manual work or conditions entailing prolonged or frequent fatigue aggravate and may thus render apparent previously unsuspected states of sub-standard nutrition. This is of special interest to the clinician during war-time because the particularly high incidence of mental stress and fatigue together with the increased difficulty of maintaining an optimal diet obviously aggravate the tendency to malnutrition.

The factors of the vitamin B complex are notably important in this connection, recent work[1] on induced vitamin B_1 deficiency having indicated the importance of a liberal supply to a nation at war.

EFFECTS OF VITAMIN B_1—Deficiency and Sufficiency

Restricted intake of vitamin B_1, over a period of several weeks, to a group of healthy people receiving adequate amounts of all the other food factors, was shown to produce marked symptoms of moodiness, sluggishness, indifference, fear, decreased mental alertness and physical fatigue. These symptoms rapidly disappeared when vitamin B_1 was added to the diet. Other subjects who had remained in apparent good heath on a vitamin B_1 intake almost up to standard (300 i.u. daily) were found to show increased alertness and an almost doubled capacity for physical work when the daily vitamin intake was increased to 600 i.u.

This and other experimental and clinical work indicate quite clearly the value of an adequate vitamin B intake for combating mental strain and physical fatigue and for preventing other evil effects of malnutrition aggravated by war conditions.

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To meet the body's requirements for vitamin B_1 is not easy if dependence is placed entirely on the ordinary everyday diet as a source of this factor. The margin between the average intake and the physiological needs is small, even in a well-arranged diet, and there is little capacity for storage of the vitamin by the body. Hypovitaminosis-B quickly follows if continuous adequate intake is not maintained.

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[1] Proc. S. M. Mayo Clin. 14,787 (1939).

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B_2. (riboflavin) 0.9 mg. per ounce		Iron	0.0047%
P.P. factor (nicotinic acid) 1.1 mg. per ounce		Copper	0.0015%
B_6. (adermin) 0.45 mg. per ounce		Magnesium	0.31%
E. (*a*-tocopherol) 7-10 mg. per ounce		Sodium and Potassium	0.64%
		Chlorine	0.017%

The Food Constituents			
Protein	34.0%*	Mineral Salts	4.5%
Digestible Carbohydrate	46.5%	Water	5.0%
Fat	8.5%	Cellulose (fibre)	1.5%*

* *Note the exceptionally high protein and low fibre content.*

NEW FOOD VALUE CALCULATOR

The Food Value Calculator, just published by Vitamins Ltd., simplifies the onerous work of evaluating family and institutional diets in terms of protein, calories, vitamins A, B_1 and C; calcium and iron. It does this by grouping common foods into nine main categories. The first known application to dietetic calculations of the wheel design has produced a device which may shorten to a period of days surveys hitherto taking months. Those having only occasional need to evaluate diets will appreciate the facility of carrying out such work without having to assemble information from many scattered sources.

The price is 2/6 each, post free. Special terms for larger quantities.

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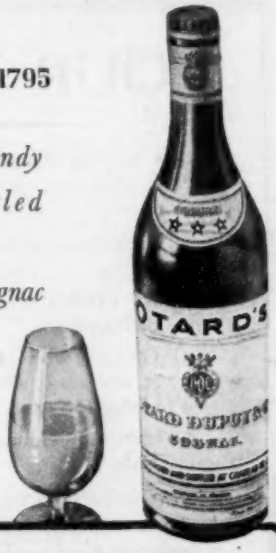

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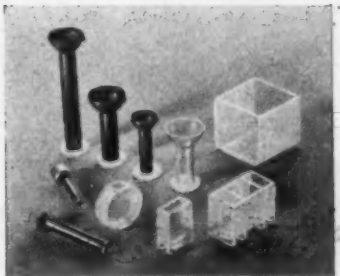

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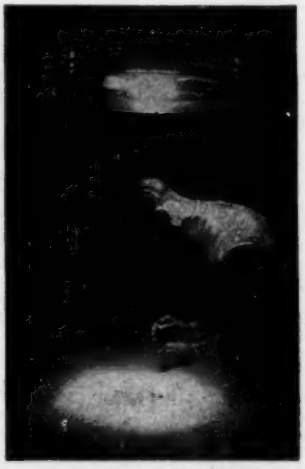

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WAR SURGERY OF THE ABDOMEN
11th to 15th May, 1942

Monday, 11th May	10 A.M.	Introduction	Surg. Rear-Admiral Gordon-Taylor, O.B.E., M.S., F.R.C.S.
	11.15 A.M.	Types of Abdominal Wounds and their Consequences.	Surg. Rear-Admiral Gordon-Taylor, O.B.E., M.S., F.R.C.S.
	12.15 P.M.	Pre-operative and Post-operative Treatment of Abdominal Wounds.	Mr. R. H. Franklin, F.R.C.S.
	2 P.M.	Some Personal Observations on Casualties seen in the present War.	Major-General P. H. Mitchiner, C.B.E., M.S., F.R.C.S.
Tuesday, 12th May	10 A.M.	Injuries of the Kidney and Ureter, including Gunshot Wounds.	Mr. John Everidge, O.B.E., F.R.C.S.
	11.15 A.M.	The Bladder in War Injuries.	Mr. John Everidge, O.B.E., F.R.C.S.
	2 P.M.	The Pathology of Abdominal Wounds.	Lieut.-Colonel A. L. D'Abreu, F.R.C.S.
Wednesday, 13th May	10 A.M.	Wounds of Solid Viscera ..	Prof. G. Grey Turner, LL.D., D.Ch., M.S., F.R.C.S.
	11.15 A.M.	Gunshot Wounds of Rectum and Large Bowel.	Mr. G. T. Mullally, M.S., F.R.C.S.
	12.30 P.M.	X-ray Demonstration ..	Dr. Duncan White, M.B., Ch.B., D.M.R.E.
	2 P.M.	Immediate Complications of Abdominal Wounds.	Surgeon Com. Frank Stabler, M.D., F.R.C.S.
	3 P.M.	Some Late Complications and Sequelæ.	Surgeon Com. Frank Stabler, M.D., F.R.C.S.
Thursday, 14th May	10 A.M.	Gunshot Wounds in the Field.	Lieut.-Col. W. Underwood, F.R.C.S.
	11.15 A.M.	Technique of Operation for Abdominal Wounds.	Lieut.-Col. W. Underwood, F.R.C.S.
	2 P.M.	Gunshot Wounds of Urethra.	Mr. Clifford Morson, O.B.E., F.R.C.S.
	3.15 P.M.	Gunshot Wounds of External Genitalia.	Mr. Clifford Morson, O.B.E., F.R.C.S.
Friday, 15th May	10 A.M.	Abdomino-thoracic Wounds.	Mr. R. C. Brock, M.D., F.R.C.S.
	11.15 A.M.	Complications of Gunshot Wounds of Rectum and Large Bowel.	Mr. A. L. Abel, M.S., F.R.C.S.
	12.30 P.M.	Anæsthesia	Dr. H. Woodfield Davies, L.M.S.S.A.
	2 P.M.	Operative Surgery Demonstration.	Mr. A. K. Henry, F.R.C.S.

The fee for the Course will be one guinea, but no fee will be charged in the case of officers of the Armed Forces who are nominated for the Course by their respective Director-Generals. Applications for admission should be addressed to the DEAN, British Postgraduate Medical School, Ducane-road, W.12.

Further War Courses wil !commence as follows:—

WAR MEDICINE	MONDAY, 1ST JUNE, 1942.
TREATMENT OF FRACTURES (limited to 40)	MONDAY, 15TH JUNE, 1942.
WAR SURGERY OF THE CHEST	MONDAY, 29TH JUNE, 1942.

L. M. S. S. A.

FINAL EXAMINATION: SURGERY, June 8th, July 13th, August 10th, 1942; MEDICINE, June 15th, July 20th, August 17th, 1942; MIDWIFERY, June 16th, July 21st, August 18th, 1942.

For regulations apply REGISTRAR, Apothecaries' Hall, Black Friars-lane, London, E.C.4.

Beit Memorial Fellowships for MEDICAL RESEARCH.

Notice is hereby given that an ELECTION of JUNIOR FELLOWS to begin work on 1st October will take place in July, 1942. Junior Fellowships are normally of the annual value of £400 for three years; but candidates, younger than those usually elected or whose promise for medical research must be judged mainly on work outside that field, may be awarded a lower rate of £300 for the first two years. Candidates are asked to state whether they would be unable to accept this lower initial rate.

Candidates must have taken a Degree in a Faculty of a University in the British Empire or a Medical Diploma registrable in the United Kingdom. Elections to Junior Fellowships are rarely made above the age of thirty-five years.

The Trustees are desirous of furthering research in Mental Diseases and in the general allotment of Fellowships will give some preference to a candidate proposing research on approved lines in that subject.

Applications from candidates should be received by 14th May, though late entries will be accepted up to 1st June.

Owing to the disturbance caused by the war, it is necessary for candidates to submit evidence that they could be given accommodation in the departments where they propose to work.

Forms of application and all information may be obtained by letter only addressed to—

PROFESSOR T. R. ELLIOTT, M.D., F.R.S.,
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Illustrated Brochure and particulars obtainable from A. E. CARVER, M.D., D.P.M., Resident Medical Superintendent.

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This Registered Hospital is situated in 130 acres of park and pleasure grounds. Voluntary patients, who are suffering from incipient mental disorders or who wish to prevent recurrent attacks of mental trouble; temporary patients, and certified patients of both sexes are received for treatment. Careful clinical, bio-chemical, bacteriological, and pathological examinations. Private rooms with special nurses, male or female, in the Hospital or in one of the numerous villas in the grounds of the various branches can be provided.

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This is a Reception Hospital in detached grounds with a separate entrance, to which patients can be admitted. It is equipped with all the apparatus for the complete investigation and treatment of Mental and Nervous Disorders by the most modern methods: insulin treatment is available for suitable cases. It contains special departments for hydrotherapy by various methods, including Turkish and Russian baths, the prolonged immersion bath, Vichy Douche, Scotch Douche, Electrical baths, Plombieres treatment, etc. There is an Operating Theatre, a Dental Surgery, an X-Ray Room, an Ultra-violet Apparatus, and a Department for Diathermy and High-frequency treatment. It also contains Laboratories for bio-chemical, bacteriological, and pathological research. Psychotherapeutic treatment is employed when indicated.

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At all the branches of the Hospital there are cricket grounds, football and hockey grounds, lawn tennis courts (grass and hard courts), croquet grounds, golf courses, and bowling greens. Ladies and gentlemen have their own gardens, and facilities are provided for handicrafts, such as carpentry, etc.

For terms and further particulars apply to the Medical Superintendent (TELEPHONE: No. 2356 and 2357 Northampton), who can be seen in London by appointment.

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The Pioneer Hospital, opened 1796, for the humane treatment of those suffering from Nervous and Mental Disorder

This Hospital of 200 beds, administered by a Committee of the Society of Friends, combines what is best in the investigation and treatment of nervous illness with a sympathetic and friendly atmosphere. Last year 156 patients were admitted, of whom 132 were voluntary cases.

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(Telephone: York 3612)

PECKHAM HOUSE, 112, Peckham Road, London, S.E.15

Telegrams: "Alleviated, London" **Telephone: Rodney 2641-2642**

A Private Mental Hospital, for Ladies and Gentlemen suffering from Nervous and Mental Illness, where the amenities of a comfortable home are combined with full investigation and every well-established modern treatment.

Terms from 3½ guineas weekly.

Illustrated Prospectus may be obtained from the Physician Superintendent.

TOR-NA-DEE SANATORIUM

Managing Director: DAVID LAWSON, M.D., F.R.S.E.

FOR THE TREATMENT OF PULMONARY TUBERCULOSIS AND ALLIED DISEASES

Medical Superintendent: R. Y. KEERS, M.D. (Edin.)

For prospectus apply to The Secretary, Tor-na-Dee, Murtle, Aberdeenshire Telephone: Cults 107

THE COTSWOLD SANATORIUM

On the Cotswold Hills seven miles from Cheltenham, Stroud and Gloucester. Fully equipped for the treatment of all forms of Tuberculosis. **Terms: 5½ to 9½ guineas per week, inclusive.** Full particulars from MEDICAL SUPERINTENDENT Cotswold Sanatorium, Cranham, Gloucester. *Telephone:* Witcombe 81. *Telegrams:* "Hoffman, Birdlip."

CAMBERWELL HOUSE, 33, Peckham Road, London, S.E.5

Telegrams: "PSYCHOLIA, LONDON" FOR THE TREATMENT OF MENTAL DISORDERS *Telephone:* RODNEY 4343 (2 lines)

Completely detached Villas for mild cases. Voluntary Patients received. Twenty acres of grounds; own garden produce. Hard and grass tennis courts, putting greens, Recreation Hall with Badminton Court, and all indoor amusements. Occupational therapy, Calisthenics, Actino-therapy, prolonged immersion baths, shock and also modified insulin treatment. Chapel.

Senior Physician, Dr. HUBERT JAMES NORMAN, assisted by a resident Medical Staff and visiting Consultants

An Illustrated Prospectus giving fees, which are strictly moderate, may be obtained upon application to the Secretary

The Convalescent Branch is HOVE VILLA, BRIGHTON, and is 200 ft. above sea-level

THE OLD MANOR, SALISBURY

Telephone: 3216 & 3217

A Private Hospital for the Care and Treatment of those of both sexes suffering from MENTAL DISORDERS

Extensive grounds. Detached Villas. Chapel. Garden Produce from own gardens. Terms very moderate.

CONVALESCENT HOME AT BOURNEMOUTH

standing in 12 acres of ornamental grounds, with separate villas, tennis courts, etc. Patients or Boarders may visit the Home by arrangement.

Illustrated Brochure on application to the Medical Superintendent, The Old Manor, Salisbury.

SPRINGFIELD HOUSE

Phone: BEDFORD 3417. **Near BEDFORD**

For Mental Cases with or without Certificates.

Ordinary Terms: Five Guineas per week (including Separate Bedrooms for all suitable cases without extra charge).

For forms of admission, &c., apply to the Resident Physician, CEDRIC W. BOWER.

INTERVIEWS IN LONDON BY APPOINTMENT.

HEIGHAM HALL, NORWICH

PRIVATE MENTAL HOME for Nervous and Mental Illness. All forms of treatment available. Fees from 4 gns. per week upwards according to requirements. Vacancies occasionally exist at reduced fees on the recommendation of the patient's own physician.

Apply to Dr. J. A. SMALL. Telephone: Norwich 20080

THE COPPICE, NOTTINGHAM

HOSPITAL FOR MENTAL DISEASES

President: The Right Hon. LORD BELPER

REGISTERED HOSPITAL for Voluntary, Temporary, or Certified PRIVATE PATIENTS of UPPER and MIDDLE CLASSES. Own kitchen garden. Modern forms of treatment, including Electro-shock Therapy. Out-door games, cinema visits, motor drives arranged. Visiting Chaplain.

For terms, &c., apply to: Dr. G. M. WODDIS, Medical Superintendent. Telephone: 64117 Nottingham.

UNIVERSITY EXAMINATION POSTAL INSTITUTION

17, RED LION SQUARE, LONDON, W.C.1

Over 50 years' experience

POSTAL COACHING FOR ALL MEDICAL EXAMINATIONS

MEDICAL PROSPECTUS (36 pages)

sent gratis, along with List of Tutors, &c., on application to the Principal, 17, Red Lion-square, London, W.C.1. (Telephone: HOLborn 6318.)

Examining Surgeons:

FACTORIES ACT, 1937.

The following appointments as Examining Surgeon under the Factories Act, 1937, are vacant.

Applications should be sent to the CHIEF INSPECTOR OF FACTORIES, 28, Broadway, London, S.W.1.

District	*County*	*Latest date for receipt of application*
LLANSAWEL ..	CARMARTHEN ..	12th May, 1942.
LLANDILO ..	CARMARTHEN ..	12th May, 1942.

Memorial Hospital,

Shooters Hill, London, S.E.18.
(General Hospital—112 Beds.)

Applications are invited from Male registered medical practitioners (including R practitioners within six months of qualification) for the appointment of a JUNIOR RESIDENT MEDICAL OFFICER (A post), to become vacant on 1st June, 1942. The appointment will be for six months. Remuneration will be at the rate of £175 per annum, with full residential emoluments.

Applications should be made on the prescribed form, obtainable from the undersigned, and sent in with copies of three recent testimonials to reach him not later than 14th May, 1942.

R. S. G. HUTCHINGS, Secretary.

Royal Eye Hospital,

St. George's-circus, S.E.1.

Applications are invited from registered medical practitioners for the appointment of HOUSE SURGEON (B2), to become vacant immediately. R practitioners holding A posts may apply when appointment will be limited to six months; otherwise may be extended for a further six months. Salary is at the rate of £150 per annum, with full emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by three recent testimonials, should be sent to: F. E. D'ALTON, Secretary.

Hospital for Consumption and Diseases

OF THE CHEST, Brompton, S.W.3.

The Committee of Management invite applications for the post of TEMPORARY PATHOLOGIST (B1), preferably for whole-time duty. Salary according to experience, but not exceeding £550 per annum, and, subject to the requirements of the Hospital being fully met, private practice will not be debarred. The appointment is for twelve months in the first instance. Duly qualified Women are eligible for appointment, and suitably qualified R practitioners holding B2 or B1 posts may apply.

Applications, with copies of testimonials, must reach the undersigned not later than Wednesday, 13th May, 1942.

Brompton Hospital, S.W.3. F. G. ROUVRAY, Secretary.

British Broadcasting Corporation.

Applications are invited for the post of MEDICAL OFFICER. Applicants must be of British nationality and have British medical qualifications, preferably including the diploma in Public Health. They should have had public health or similar experience enabling them to advise the Corporation on all matters concerning the health, physical welfare, and conditions of service of staff throughout the country. The appointment is for the duration of the war, and there can be no guarantee of entry to the permanent staff. The salary is on a scale rising from a minimum of £1050 a year by annual increments of £75 to a maximum not exceeding £1500 a year.

Applications, marked "Medical Officer," must be made on a form which will be sent by the RECRUITMENT DIRECTOR, Broadcasting House, London, W.1, on receipt of a stamped addressed foolscap envelope. Completed forms must be received by the 15th May.

Royal Free Hospital,

Gray's Inn-road, London, W.C.1.

Applications are invited from registered medical practitioners for the appointment of RESIDENT ASSISTANT MEDICAL REGISTRAR (B1). The duties will comprise mainly those of Casualty Officer. Suitably qualified R practitioners holding B2 or B1 appointments are invited to apply. Salary £350 per annum, payable by the Ministry of Health.

Applications, stating age, and accompanied by copies of three recent testimonials, should be sent to the undersigned (from whom all information may be obtained) on or before the 9th day of May. Duties to commence 1st June.

RICHARD T. BARTLEY, Secretary.

St. John's Hospital, Lewisham, S.E.13.

Applications are invited from medical practitioners for appointment as from 1st June as RESIDENT SURGICAL OFFICER (B1). Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding diploma of F.R.C.S. Suitably qualified R practitioners holding B2 or B1 appointments are invited to apply. Salary £250 per annum, plus panel fees for resident female staff, but previous Resident Surgical Officers have held the E.M.S. surgical appointment of £550 per annum.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, and accompanied by copies of recent testimonials, should be sent as soon as possible to: J. C. GILBERT, Secretary-Superintendent.

County Borough of West Ham.

Applications are invited for the post of TEMPORARY FIRST ASSISTANT MEDICAL OFFICER at FOREST GATE HOSPITAL, Forest-lane, E.7, for the duration of the war, but can be terminated at any time by one month's notice by either side. Salary £525 per annum, rising by annual increments of £25 to a maximum of £600 per annum, plus temporary war bonus, with apartments, board, and laundry valued at £150.

Candidates must be qualified registered medical practitioners, and preference will be given to those who have had, in addition to a general hospital appointment, an appointment in a hospital where they have had charge of maternity beds. The person appointed will be in charge of the hospital during the absence of the Medical Superintendent.

The successful candidate must be prepared to serve in any other of the Council's institutions.

The appointment will be subject to the Council's regulations as made from time to time regarding holidays, sick pay, &c., and the successful candidate will be required to pass a medical examination.

Forms, upon which application must be made, with relevant particulars, can be obtained from Dr. E. Ashworth Underwood Medical Officer of Health, 88, Romford-road, West Ham, E.15, on receipt of a stamped addressed foolscap envelope, and should be returned to the undersigned not later than 6th May, 1942.

Canvassing members of the Council is prohibited and will disqualify. CHARLES E. CRANFIELD, Town Clerk.

Town Hall, West Ham, E.15, 15th April, 1942.

HIS MAJESTY'S COLONIAL SERVICE

THE COLONIAL MEDICAL SERVICE

VACANCIES FOR MEDICAL OFFICERS

The maintenance of an efficient Colonial Medical Service constitutes a vital part of the national war effort and it is most important that the Service should be assured of an adequate supply of doctors.

The Secretary of State for the Colonies therefore invites applications from doctors possessing a medical qualification registrable in the United Kingdom who are British subjects and who are under thirty-five years of age.

Medical Officers are appointed in the first instance for general service. But there are ample opportunities for work in special branches of medicine and surgery, in public health and in medical research.

The normal salary scale is from £630 to between £1,000 and £1,120. There are large numbers of super-scale posts to which promotion is made on merit and which carry higher salaries.

Government quarters, in many cases free of rent, and first-class passages to and from the Colonies are provided, and an adequate pension scheme is in force.

Selected candidates are normally required to attend a course of instruction in Tropical Medicine and Hygiene either before proceeding overseas or during their first period of leave.

Further particulars, including the regulations governing admission to the Colonial Medical Service, may be obtained from the Director of Recruitment (Colonial Service), 2, Park-street, London, W.1.

County Borough of West Ham.

SOCIAL SERVICES COMMITTEE.

Applications are invited for the posts of Three TEMPORARY RESIDENT MEDICAL OFFICERS (B1) (Male) at WHIPPS CROSS HOSPITAL, Leytonstone, E.11. Suitably qualified R practitioners holding B1 or B2 appointments may apply. Salary £350 per annum, rising by increments of £25 per annum to a maximum of £450 per annum, plus temporary war bonus, with apartments, board, and laundry valued for superannuation purposes at £100 per annum. The salary is inclusive and all fees received, from whatever source, must be paid to the Council.

Candidates must be fully qualified registered medical practitioners of British nationality, and should have held a previous resident hospital appointment. Preference will be given to candidates with practical experience of surgical operations, and the person appointed must give his whole time to the service of the Council, and will be required, should the occasion arise, to act in any of the Council's other institutions. The appointment will be subject to the Council's regulations as made from time to time regarding holidays, sick pay, &c.

The successful candidate will be required to pass a medical examination, and the appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the statutory contributions will be deducted from the salary.

Forms of application can be obtained from Dr. E. Ashworth Underwood, Medical Officer of Health, 88, Romford-road, West Ham, E.15, or will be forwarded on receipt of a stamped addressed foolscap envelope, and must be returned to the undersigned not later than 15th May, 1942.

Canvassing members of the Council is prohibited and will disqualify. CHARLES E. CRANFIELD, Town Clerk.

Town Hall, West Ham, E.15, April, 1942.

Resident Junior Assistant Medical

OFFICER (B2) (Woman) required by MIDDLESEX COUNTY COUNCIL at REDHILL COUNTY HOSPITAL, Edgware, Middlesex. Applicants must be registered medical practitioners with obstetric experience. Salary £250 per annum, plus cost-of-living bonus. Board, lodging, and laundry. Whole-time obstetric duties at the Maternity Hospital, Bushey Heath (50 Beds), under supervision of Medical Superintendent and Obstetric Surgeons of Redhill, of which the Maternity Hospital is administered as an annexe. Appointment, subject to medical examination and one month's notice, is for six months, with possibility of extension to twelve months. Post now vacant.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, to the undersigned. No application forms provided. Relationship to any member or officer of the Council to be disclosed. Copies of not more than three recent testimonials. Canvassing, directly or indirectly, will disqualify. Closing date 9th May.

C. W. RADCLIFFE, "B3," Clerk of the County Council.

Middlesex Guildhall, Westminster, S.W.1.

Middlesex County Council.

RESIDENT CASUALTY OFFICER (B1) required for REDHILL COUNTY HOSPITAL, Edgware, Middlesex. Must be registered medical practitioners (including suitably qualified R practitioners in B2 or B1 posts) who have held house appointments in general hospitals and had good all-round experience. Salary £350 per annum, plus cost-of-living bonus. Board, lodging, and laundry. Whole-time duties under Medical Superintendent will include dealing with casualties and admissions to hospital, and such other duties as may be required. Appointment, subject to medical examination and one month's notice, is primarily for six months with possibility of extension for further six months. Post vacant 15th May, 1942.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, to the undersigned. No application forms provided. Relationship to any member or officer of the Council to be disclosed. Copies of not more than three recent testimonials. Canvassing, directly or indirectly, will disqualify. Closing date 9th May, 1942. C. W. RADCLIFFE, "B3," Clerk of the County Council.

Guildhall, Westminster, S.W.1.

Resident Assistant Medical Officer

(Woman B1) required by MIDDLESEX COUNTY COUNCIL for REDHILL COUNTY HOSPITAL, Edgware, Middlesex. Applicants must be registered medical practitioners with considerable obstetric experience. Salary £400 by £25 to £475 per annum. Board, lodging and laundry. Wholetime obstetric duties at the MATERNITY HOSPITAL, BUSHEY HEATH (50 Beds), and such other duties as the Council may direct, under the supervision of the Medical Superintendent, and Obstetric Surgeons of Redhill, of which the Maternity Hospital is administered as an annexe. Appointment is for four years only, subject to medical examination and one month's notice. Post now vacant.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, to the undersigned. No application forms provided. Relationship to any member or officer of the Council to be disclosed. Copies of not more than three recent testimonials. Canvassing directly or indirectly will disqualify. Closing date 16th May.

C. W. RADCLIFFE "B3," Clerk of the County Council.

Middlesex Guildhall, Westminster, S.W.1.

Hampstead General Hospital.

OUT-PATIENT DEPARTMENT, N.W.1.

Applications are invited from single medical Men or Women, including R practitioners holding A posts, for post of CASUALTY SURGICAL OFFICER (B2) for six months, vacant 1st June. Salary £100 per annum, plus allowance at £50 per annum for duties in connexion with First-aid Post established there.

Applications, on prescribed form, with copies of three testimonials, to be returned by 14th May.

KENNETH A. F. MILES, House Governor.

Tilbury Hospital, Essex.

Applications are invited from British Male registered medical practitioners for the appointment of HOUSE OFFICER (B2) falling vacant on 1st June, including R practitioners who now hold A posts, when appointment will be for a period of six months. Salary at the rate of £200 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, and accompanied by three recent testimonials, to be sent on or before 18th May, marked "Tilbury," to: F. A. LYON, Secretary.

Seamen's Hospital Society, Greenwich, S.E.10.

York Dispensary.

Applications are invited for the post of RESIDENT MEDICAL OFFICER (Female), to commence duties as soon as possible. The duties consist chiefly in visiting and attending the sick poor in their own homes and in assisting the Honorary Medical Staff. Candidates must be duly qualified, registered, and unmarried. Experience in the administration of anæsthetics is essential. Salary £220 per annum, with board, lodging, and laundry. There is a substantial car allowance should the successful applicant be possessed of and wish to use own car.

Applications, with testimonials, to be sent immediately to—

JOHN C. PETERS, Secretary.

4, New-street, York, 27th April, 1942.

The Liverpool Eye, Ear and Throat

INFIRMARY, Myrtle-street, LIVERPOOL, 7.

Applications are invited from registered medical practitioners (Male or Female) for appointment of OPHTHALMIC HOUSE SURGEON (B2), including R practitioners who now hold A posts, when the appointment would be limited to six months. Salary at rate of £120 per annum, with full residential emoluments.

Applications, stating age, experience, qualifications with dates, nationality, and present post, and accompanied by copies of three testimonials, should be sent to the undersigned immediately. GEORGE NICKSON, Secretary.

City of Manchester.

CRUMPSALL HOSPITAL. (1400 Beds.)
(Recognised under the Regulations for the F.R.C.S.)

APPOINTMENT OF RESIDENT ANÆSTHETIST (A).

Applications are invited from registered medical practitioners for the above-mentioned post which will become vacant on 10th May, 1942, including R practitioners within three months of qualification. To R practitioners the appointment will be for a period of six months; otherwise it will be for a period of six months renewable for a further six months and not renewable thereafter. The basic salary is £250 per annum or, if held by an R practitioner as above, £225 per annum, with board, residence, and laundry in addition. A temporary cost-of-living wages award is payable in addition to the foregoing salaries. The appointment is subject to the Manchester Corporation conditions of service.

Full information and forms of application may be obtained from the Medical Officer of Health, Hospitals Administration Section, P.O. Box No. 399, Town Hall, Manchester, 2, and applications for the post must be received by him not later than 12th May, 1942.

Canvassing in any form is prohibited.

R. H. ADCOCK, Town Clerk.

Town Hall, Manchester, 2, 22nd April, 1942.

Education Committee for the County
BOROUGH OF BRIGHTON.

APPOINTMENT OF TEMPORARY SENIOR MEDICAL OFFICER AND ASSISTANT TO THE MEDICAL OFFICER OF HEALTH.

Applications are invited for the above appointment. Candidates must have had experience of the School Medical Services, possess the Diploma in Public Health, or its equivalent, and be approved by the Board of Education for Mental Deficiency work.

The officer appointed will act under the supervision of the Medical Officer of Health and may be required to act as his deputy, and will be required to devote the whole time to the service of the authority.

Salary £850, rising by biennial increments of £50 to a maximum of £1000.

Canvassing, directly or indirectly, will disqualify.

Form of application and schedule of duties may be obtained from the EDUCATION OFFICER, 54, Old Steine, Brighton, 1, and must be returned by the 11th May, 1942.

Oldham Royal Infirmary.

Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A), to become vacant about the 17th May, including R practitioners within three months of qualification when appointment will be for a period of six months. Salary is at the rate of £175 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent not later than the 8th May, 1942, to—

F. W. BARNETT, General Superintendent and Secretary.

Leicester Royal Infirmary.

Applications are invited for the post of OBSTETRIC HOUSE SURGEON (Female) to the MATERNITY HOSPITAL, Causeway-lane (52 Beds). The appointment is for six months, remuneration at the rate of £150 per annum.

Applications, with copies of testimonials, to be forwarded to the HOUSE GOVERNOR AND SECRETARY at the Infirmary on or before 5th May.

County Borough of Newport.
PUBLIC ASSISTANCE COMMITTEE.

JUNIOR RESIDENT MEDICAL OFFICER (A Post)
(TEMPORARY APPOINTMENT).

Applications are invited from registered medical practitioners, including R practitioners within three months of qualification, for the above appointment at WOOLOSTON HOUSE HOSPITAL, Newport, Mon. Salary £150 per annum, with the usual residential emoluments, plus a cost-of-living bonus. All fees, with the exception of coroners' fees, are payable to the Public Assistance Committee. Appointment is limited to one year, terminable by one month's notice on either side. To R practitioners the appointment will be for a period of six months.

Applications, stating age, qualifications, and experience, and accompanied by copies of three recent testimonials, should be sent at once to: TOM KAY, Public Assistance Officer.

Town Hall, Newport, Mon, April, 1942.

Doncaster Royal Infirmary.

Applications are invited from registered medical practitioners (Male) for the appointment of ORTHOPÆDIC HOUSE SURGEON (B2), including R practitioners who now hold A posts when appointment will be limited to six months.

The salary is at the rate of £175 per annum, with usual emoluments.

R. LANCASTER, Secretary-Superintendent.

Royal Earlswood Institution for Mental
DEFECTIVES, REDHILL, SURREY.

ASSISTANT MEDICAL OFFICER required, single, British (B1 post). Suitably qualified R practitioners holding B2 or B1 appointments may apply. Facilities available for attending D.P.M. course. Salary £350 per annum, board-residence provided. Apply MEDICAL SUPERINTENDENT.

City of Plymouth.

CITY GENERAL HOSPITAL. (320 Beds.)

Applications are invited from duly qualified and registered medical practitioners, Male and Female, for the post of ASSISTANT MEDICAL OFFICER (B2), including suitably qualified R practitioners in A posts when appointment will be limited to six months; otherwise it will be renewable for a further period of six months, terminable by one month's notice on either side.

Salary will be at the rate of £300 per annum, plus a war bonus of £18 4s. annually, with full residential emoluments. All fees received by the officer must be refunded to the Council.

Previous experience in a maternity hospital, or in the maternity wards of a general hospital, is essential, as the duties of the post are largely in the Maternity Department, in which is included a Maternity Home a few miles from the City.

Further details of the post are obtainable from the Medical Superintendent of the City Hospital, Plymouth.

Applications, stating age, nationality, and experience, together with copies of not more than three recent testimonials, should be sent as soon as possible to—

T. PEIRSON, Medical Officer of Health.

Seven Trees, Lipson-road, Plymouth.

The Royal Eastern Counties' Institution
FOR THE MENTALLY DEFECTIVE, COLCHESTER.

ASSISTANT MEDICAL OFFICER (B1) (MALE).

Applications are invited for the above post from duly qualified medical practitioners. Ineligible for military service, or over 41. Total Beds over 1700.

The medical man appointed will be stationed at the Extension, Turner Village, which has at present 500 Beds.

The salary will be at the rate of £400 per annum, rising, subject to the directors' approval, by £25 annually to £450 per annum, together with furnished apartments, board, laundry, and attendance. No deductions. Previous specialisation in mental deficiency not necessary.

There is a new and fully equipped laboratory.

Apply, giving age, nationality, full details of qualifications and copies of testimonials, to the MEDICAL SUPERINTENDENT Royal Institution, Colchester.

Broadmoor Criminal Lunatic Asylum,
CROWTHORNE, BERKS.

Applications are invited from registered medical practitioners, Male, British nationality, for the post of TEMPORARY JUNIOR MEDICAL OFFICER at the above Institution. Salary is at the rate of £525 per annum, with furnished quarters and attendance but not board.

Applications, stating age and qualifications, and accompanied by copies of three recent testimonials, should be sent to the MEDICAL SUPERINTENDENT as soon as possible.

Royal West Sussex Hospital,
CHICHESTER. (334 Beds.)

Applications are invited from registered medical practitioners for the appointment of RESIDENT SURGICAL OFFICER (B2), vacant on 1st June next. The appointment is for six months. R practitioners holding A posts may apply. Salary £225 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, nationality, and present post, together with three recent testimonials, should be sent by 18th May, 1942, to—

K. H. WILLIAMS, House Governor and Secretary.

29th April, 1942.

The Royal Infirmary, Sunderland.

Applications are invited from registered medical practitioners for the appointment of ORTHOPÆDIC HOUSE SURGEON (B2), to become vacant on 1st June, 1942, including R practitioners who now hold A posts, when appointment will be limited to six months; otherwise it will be for a period of six months in the first instance. Salary is at the rate of £225 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, nationality, and present post, and accompanied by copies of three recent testimonials, should be sent at the earliest possible date to—

M. J. HUNTLEY, House Governor and Secretary.

Cefn Coed Hospital, Swansea.

Applications are invited from registered medical practitioners for the post of ASSISTANT MEDICAL OFFICER (B1) (Temporary) at the above Hospital. Suitably qualified R practitioners holding B2 or B1 posts may apply. Salary £400 per annum, with emoluments valued at £100 if resident in the Hospital, or £500 if non-resident.

Applications, stating age, qualifications, and experience, to MEDICAL SUPERINTENDENT not later than 6th May, 1942.

Nottingham General Hospital.
(535 Beds.)

Applications are invited from registered medical practitioners (Male or Female) for the appointment of HOUSE SURGEON (B2), including R practitioners who now hold A posts. The appointment is for six months. Duties to commence as soon as possible. Salary at the rate of £200 per annum.

Applications, stating age, qualifications with dates, nationality, and accompanied by testimonials should be sent to—

HENRY M. STANLEY, House Governor and Secretary.

Nottinghamshire County Council.

RANSOM SANATORIUM.

Applications are invited from duly qualified and registered Female medical practitioners for the appointment of JUNIOR ASSISTANT RESIDENT MEDICAL OFFICER (B2) at the COUNTY TUBERCULOSIS SANATORIUM, Sherwood Forest, near Mansfield (165 Beds).

The salary, payable monthly, will be at the rate of £200 per annum, plus war bonus, together with board, residence, and laundry. The appointment is a temporary one for one year and will be terminable by one month's notice on either side.

The person appointed will be required to reside at the Sanatorium and will act under the direction of the Medical Superintendent.

Applications, stating age, qualifications, and experience, and accompanied by copies of not more than three recent testimonials, should be forwarded to the County Medical Officer, Shire Hall, Nottingham, as soon as possible.

K. TWEEDALE MEABY, Clerk of the County Council.

Shire Hall, Nottingham, 24th April, 1942.

County Borough of Grimsby.

Applications are invited for the appointment of ASSISTANT MEDICAL OFFICER FOR CIVIL DEFENCE (Male) in the County Borough of Grimsby. The officer appointed will be responsible under the Medical Officer of Health for the general organisation and administration of the Casualties Services of the Borough, and may also occasionally be required to carry out such other duties as the Medical Officer of Health may so direct.

The appointment is a temporary one, subject to a month's notice on either side. The salary will be at the rate of £600 per annum, plus £30 per annum car allowance.

Applications, stating age, qualifications, and experience, together with copies of testimonials or names of persons to whom reference may be made, should be forwarded not later than the 7th May, 1942, to: L. W. HEELER, Town Clerk.

Municipal Offices, Grimsby, 16th April, 1942.

County Borough of Oldham.

BOUNDARY PARK GENERAL HOSPITAL.

Applications are invited from unmarried registered medical practitioners, Male or Female, for the appointment of RESIDENT ASSISTANT MEDICAL OFFICER (A), including R practitioners within three months of qualification, when appointment will be for a period of six months. The successful candidate will be elegible for re-appointment for a further period of six months.

The salary is at the rate of £200 per annum (plus cost of living bonus) with full residential emoluments.

The Hospital comprises 430 Beds, with facilities for gaining experience in medicine, surgery, midwifery and the diseases of children.

Application forms and conditions of service should be obtained from the Medical Officer of Health, Town Hall, Oldham, and should be returned endorsed "Assistant Resident Medical Officer" not later than 11th May, 1942.

THOMAS ALKER, Town Clerk.

Town Hall, Oldham, 20th April, 1942.

Royal Cornwall Infirmary, Truro.

(285 Beds—4 Residents.)

Applications are invited from registered medical practitioners, Male and Female, for the appointment of a SENIOR HOUSE SURGEON (B2) in charge of the Male and Female Surgical Wards, including R practitioners who now hold A posts when appointment will be limited to six months. The salary is at the rate of £225 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, nationality, and present post, and accompanied by copies of three recent testimonials, should be sent to—

W. E. GRENFELL, Honorary Secretary.

Truro, 14th April, 1942.

Royal United Hospital, Bath.

Applications are invited from registered medical practitioners (Male) for the following appointment, which becomes vacant immediately: HOUSE SURGEON (A) (General Surgery and Ear, Nose, and Throat). R practitioners within three months of qualification may apply when appointment will be for a period of six months. Salary £150 per annum, with board, residence, and laundry.

Applications, stating age, qualifications, and experience, together with a copy of three testimonials, to reach the undersigned at once.

J. LAWRENCE MEARS, Secretary-Superintendent.

10th April, 1942.

Doncaster Royal Infirmary.

Applications are invited from registered medical practitioners, including R practitioners within three months of qualification, for a HOUSE SURGEON (Male) (A appointment) required immediately. The appointment is for six months. Salary at the rate of £175 per annum, with residence, board, and laundry. This large industrial area offers excellent opportunities for gaining experience.

Applications, accompanied by not more than three testimonials, to be sent immediately to—

R. LANCASTER, Secretary-Superintendent.

Derbyshire County Council.

The Derbyshire County Council require the services of a fully qualified Whole-time WOMAN ASSISTANT MATERNITY AND CHILD WELFARE MEDICAL OFFICER with experience in antenatal work, midwifery, and children's diseases, to hold (under the direction of the County Medical Officer of Health) consultations at the Antenatal and Maternity and Child Welfare Centres of the Derbyshire County Council, and to perform such other duties as appertain to the office.

The salary will be £600 per annum, rising by £25 per annum to £700 per annum.

The post will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Forms of application may be obtained from the undersigned, to whom they must be returned, together with copies of not more than three recent testimonials, not later than 9th May, 1942. W. M. ASH, County Medical Officer of Health.

New County Offices, St. Mary's-gate, Derby, 16th April, 1942.

Gloucestershire County Council.

Gloucestershire County Council invite applications for the appointment of a TEMPORARY ASSISTANT COUNTY MEDICAL OFFICER OF HEALTH at a salary of £500 per annum. Applicants must be registered medical practitioners. The appointment will be subject to a satisfactory medical report by the Council's Medical Adviser.

Forms of application, with particulars of the duties and conditions of appointment, may be obtained from the County Medical Officer of Health, 18, Berkeley-street, Gloucester, to whom completed applications, with copies of three recent testimonials, should be sent not later than 15th May. Canvassing, directly or indirectly, will disqualify.

RICHARD L. MOON, Clerk of the County Council.

City and County of Newcastle

UPON TYNE.

SHOTLEY BRIDGE HOSPITAL.

Applications are invited from registered medical practitioners for the appointment of RESIDENT SURGICAL OFFICER (B1). Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding diploma of F.R.C.S. Suitably qualified R practitioners holding B2 or B1 appointments are invited to apply. Salary is at the rate of £550 per annum, together with the usual residential emoluments.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, and accompanied by copies of three recent testimonials, should be sent immediately to the MEDICAL OFFICER OF HEALTH, Health Department, Town Hall, Newcastle upon Tyne, 1.

Lancashire County Council.

BIDDULPH GRANGE ORTHOPÆDIC HOSPITAL.

Applications are invited from registered medical practitioners Male or Female, for the appointment of RESIDENT JUNIOR HOUSE SURGEON (B2), now vacant, including R practitioners who hold A posts when appointment will be limited to six months; otherwise it will be for a minimum period of six months. The salary is at the rate of £250 per annum, together with board, residence, and laundry.

Applications, stating age, qualifications with dates, nationality, and present post, and accompanied by copies of two recent testimonials, should be sent to Dr. F. Hall, School Medical and Child Welfare Department, County Offices, Preston, not later than the 9th May.

GEORGE ETHERTON, Clerk of the County Council.

County Offices, Preston, 17th April, 1942.

North Staffordshire Royal Infirmary,

STOKE-ON-TRENT.

Applications are invited from registered medical R practitioners (Male and Female) within three months of qualification for the following posts:—

CASUALTY OFFICER (A).
HOUSE PHYSICIAN (A).
RESIDENT ANÆSTHETIST (A).

The appointments will be for a period of six months. The salary in each case is at the rate of £150 per annum, with the usual residential emoluments.

Applications, stating age, qualifications with dates, nationality, and present post, and accompanied by copies of three recent testimonials, should be sent as soon as possible to the HOUSE GOVERNOR.

Llanelly and District General

HOSPITAL. (148 Beds plus 100 Beds, ANNEXE.)

Applications are invited from registered medical practitioners, Male or Female, for the appointment of SENIOR HOUSE-SURGEON AND ANÆSTHETIST (B2) including R practitioners who now hold A posts.

To R practitioners the appointment will be limited to six months. Salary according to experience and qualifications, with minimum of £200 per annum.

Applications, stating age, qualifications with dates, nationality, and present post, accompanied by copies of three recent testimonials, should be sent immediately to—

T. E. PIPE, Secretary.

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Northumberland County Council.

HEXHAM HOSPITAL. (440 Beds.)

Applications are invited from registered medical practitioners (Male) for the appointment of RESIDENT SURGICAL OFFICER (B1). Applicants should have held previous house appointments. Suitably qualified R practitioners holding B2 or B1 appointments are invited to apply. The appointment in the first instance will be for one year, and the salary will be at the rate of £550 per annum, together with full residential emoluments. The Hospital contains an Orthopædic Centre.

Applications, stating age, nationality, qualifications with dates, experience, and details of previous appointments, and accompanied by copies of three recent testimonials, should be sent immediately to the County Medical Officer at the undermentioned address.

C. HAROLD CARTER, Clerk of the County Council.
New Senior School, Mitford-road, Morpeth, Northumberland.

Queen Victoria Hospital,

MORECAMBE AND HEYSHAM.

Applications are invited for the post of RESIDENT HOUSE SURGEON (Female), vacant 1st July, 1942. Salary £150 per annum. The Hospital has 72 Beds, with Maternity, Massage and Electrical Treatment, X-ray, Pathological, and Out-patient Departments.

Applications, stating age, nationality, qualifications with dates, and experience, accompanied by copies of testimonials and photographs, should be sent, endorsed "House Surgeon," not later than 9th May, 1942, to: THOS. P. TIPLADY, Secretary.

County Borough of Reading.

BATTLE HOSPITAL. (Total 608 Beds.)

Applications are invited from registered medical practitioners (Male) for the post of RESIDENT ASSISTANT MEDICAL OFFICER (B2) for general duties. R practitioners holding A posts are invited to apply when appointment will be limited to six months; otherwise it may be renewed. Salary will be at the rate of £300 per annum, plus residential emoluments for a single man.

Application forms may be obtained from the undersigned and should be returned to him immediately.

Town Hall, Reading. C. S. JOHNSON, Town Clerk.

Royal Isle of Wight County Hospital,

RYDE.

Applications are invited from registered medical practitioners (Female) for the appointment of a HOUSE SURGEON (B2), which became vacant on 1st May. The appointment will be for six months. Salary at the rate of £180 a year, with board, residence, and laundry. As this is the senior post, previous surgical experience is advisable.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent as soon as possible to—

A. S. GORDON, Secretary.

York County Hospital.

(222 Beds.)

Applications are invited from registered medical practitioners for the following appointment, vacant 1st May, 1942: HOUSE SURGEON (B2), for which R practitioners holding A posts may apply. To R practitioners appointment will be limited to six months. Salary is at the rate of £175 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent immediately to—

J. R. MACKRILL, Secretary.

The Southampton Children's Hospital

AND DISPENSARY FOR WOMEN.

Applications are invited from registered medical practitioners, Female, for the appointment of a RESIDENT MEDICAL OFFICER (A), now vacant. Salary is at the rate of £150 per annum, with full residential emoluments.

Applications, stating age, qualifications with dates, and nationality, and accompanied by three recent testimonials, should be sent immediately to: ELLA K. MATTHEWS, Secretary.

County Borough of Blackpool.

Applications are invited for a TEMPORARY RESIDENT MATERNITY AND CHILD WELFARE MEDICAL OFFICER (Female) with practical obstetrical experience, at Maternity Hospital established under H.M. Government's Evacuation Scheme. The salary will be at the rate of £450 per annum, plus the usual emoluments, and the appointment will be determinable by one month's notice on either side.

This advertisement does not relate to a woman between twenty and thirty-one, unless she has a Ministry of Labour permit to allow her to obtain employment by individual effort. Intended applicants between these ages should apply to their Local Employment Exchange for the necessary permit.

Applications, stating age, qualifications, and experience, should be addressed immediately to the Medical Officer of Health, Municipal Health Centre, Whitegate-drive, Blackpool.

TREVOR T. JONES, Town Clerk.

City Mental Hospital, Nottingham.

Applications are invited from registered medical practitioners for the appointment of TEMPORARY ASSISTANT MEDICAL OFFICER (B1). The appointment is whole time. Previous experience in a mental hospital is desirable but not necessary. Suitably qualified R practitioners holding B2 or B1 appointments are invited to apply. Salary £350 to £450 per annum by four £25 increases, all found, with an additional £50 per annum for D.P.M.

Applications, stating age, nationality, qualifications, and experience, accompanied by copies of three recent testimonials, should be forwarded as soon as possible to the MEDICAL SUPERINTENDENT.

Wanted mid-May, Assistant House SURGEON (A). Salary £120 per annum, with full residential emoluments. R practitioners within three months of qualification may apply when appointment will be for a period of six months.

Applications, with copies only of three testimonials, to be sent at once to the SECRETARY, ESSEX COUNTY HOSPITAL, COLCHESTER.

Chief Medical Officer required by industrial company with branches throughout the country. Salary £800 per annum. Applicant will be required to live in the West Country.—Write, giving full details, including industrial experience: Address, No. 869, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Sudan Medical Service.

Applications are invited for VACANCIES still existing in the Sudan Medical Service. Candidates must be men under thirty years of age and unmarried. Preference will be given to those who have held B appointments; some surgical experience since qualification is essential. Many members of the Service hold temporary commissions—e.g., when attached to the Sudan Defence Force or seconded for other war-time duties. Pay commences at £E720 per annum (the equivalent of £738 sterling).

Dr. SQUIRES, from whom application forms and further particulars may be obtained, would be glad to interview intending candidates as soon as possible at 93, Harley-street, W.1; Telephone No. WELbeck 3423.

Applications are invited from fully qualified medical practitioners, over military age, preferably with either industrial experience or with D.P.H. degree, for full-time appointment as MEDICAL OFFICER to a large industrial concern, engaged upon essential war work, with factories in the Greater London area. Salary £650–£800 per annum, according to qualifications.

Write, giving details of age, qualifications held, and professional experience, to "M.O.," Box 677, A.K. Advertising, 4, Talbot-mansions, Museum-street, W.C.1.

Lady Doctor required for appointment by Nottingham firm. Light duties.—Write: A. SHAW, Medical Transfer Agency, Premier Buildings, 88, Church-street, Liverpool, 1.

Australian, experienced General Practice and Surgery, wants full or part-time work, preferably North London. Own car.—Address, No. 868, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

For Sale, Medical Practice in Broughty Ferry, Dundee, established since 1919; practitioner died on active service. Panel 400; superior class private practice. Pre-war total receipts average £1450; war-time total receipts average £600. Best offer. House must also be purchased: three public rooms, six bedrooms, two bathrooms, and waiting- and consulting-rooms; excellent doctor's house. Fuller particulars from, and offers to: SMITH & MONCUR, Solicitors, 9, Ward-road, Dundee.

Old-established Practice in West Country Village. Receipts about £1500–£1600. Panel £500. Two appointments—M.O.H. £120, Poor Law £120. Good house, £1700; garden with tennis court. Books kept up to date by bookkeeper. Willing to meet prospective purchaser more than half-way for early sale.—Address, No. 865, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Savage Health Vibrator for Sale, good condition, suitable for 230 v. A.C. Reasonable offer accepted.—Address, No. 866, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Slit-lamp Microscope, Zeiss or Bausch and Lomb, urgently wanted for war work.—Address, No. 870, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

W.1.—Part-time Consulting-room wanted by Physician. With plate.—Particulars: Address, No. 867, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Harley Street and District.—A number of excellent CONSULTING ROOMS are available for full and part-time use at moderate rents. Particulars on application.—ELGOOD & Co., 1, Bentinck Street, Welbeck Street, W.1. Welbeck 8974.

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